ABDOMINAL

TUBERCULOSIS

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PREFACE

THE interest which, in recent years, has come to be attached
to the subject of tuberculosis in every shape and form, may be
offered as an excuse, if such be needed, for presenting to the
profession a study of the disease as it affects the abdomen.

That we know more about the symptoms and treatment of the
disease is largely owing to the position which surgery has come
to occupy in the elucidation of all abdominal affections. But if
surgery has played a conspicuous part in the successful treat-
ment of abdominal tuberculosis, none the less has medicine
shared in contributing her quota towards the attainment of the
same good results; and I trust it will be found that, in discuss-
ing the various sections of the subject, the following pages will
indicate an impartiality in accrediting merit to the employment
of any measures, be they medical or surgical, which aim at
combatting and conquering one of the greatest scourges of the
human race. The value I, as a surgeon, attach to the medical
aspect of the subject will, I think, be sufficiently attested by
my desire to have a chapter written on the general treatment of
the disease. It is impossible not to feel, from all we know of
the nature of tuberculosis, that something more than purely
local measures are required; and that to fight the bacilli
successfully we must wage warfare well armed with the forces
both of medicine and surgery. Dr. W. K. Hunter, who has de-
voted much time and attention to tuberculosis, has consented to
supply the last chapter dealing exclusively with the medical side
of the subject in its widest and most general aspects, and this will
add, I venture to think, no little value to the work as a whole;

for there is not a section to which it cannot be said to have some practical application. To Dr. Hunter, therefore, I feel under a special obligation for his kindness in acceding to my wish to contribute a chapter on the medical treatment of tuberculosis.

The large majority of the cases, upon which much of the text is based, are culled from my own case-books; and my thanks are due to many of my past resident assistants, to whom I am indebted for several of the reports.

The illustrations, on the other hand, are from a much wider source. I was anxious to obtain as typical examples as possible, and towards that end I visited various pathological museums. Through the kindness of the curators of these museums I was allowed to have the preparations photographed. In every instance the source from which the illustration was obtained is duly recognised in the text. For the actual photographs themselves I am greatly indebted to Mr. Henry George, the Assistant in the Pathological Department of the Royal College of Surgeons, who spared neither time nor pains in obtaining as good a photograph of each specimen as was possible. Dr. John Anderson, Pathologist to the Victoria Infirmary, was good enough to undertake for me the reading of the proofs; and my thanks are due to him not only for this and the gift of many valuable suggestions, but for the numerous pathological reports without which the record of many a case would have been necessarily incomplete.

Glasgow, April, 1908.

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ABDOMINAL TUBERCULOSIS

CHAPTER I

GENERAL REMARKS ON TUBERCULOSIS

At this advanced period of our knowledge there is no need
to enlarge on the primary and immediate cause of all tuber-
cular lesions.   That the presence of the tubercle bacillus is
the *fons et origo* of every shape and form of the disease is
sufficiently accepted to require no further discussion. But why
the bacillus should be present at a particular spot, in some
tissue or organ of the human body, is quite another matter;
and involves some of the most interesting and intricate problems
connected with morbid anatomy.

Among some of the questions of most absorbing interest
arising out of this latter consideration are those connected with
(1) the source from which the bacilli come, (2) the means of
entrance into the human body, (3) the method of transmission
to internal parts, (4) the conditions favourable to growth and
multiplication, and (5) the effect of such development and
extension on the whole system.   Any one of these questions is
sufficient in itself to form the basis of an exhaustive discussion.
While, however, it is not intended to pursue the subject to such
extremes, it is impossible not to deal with each one of these
points to a certain limited extent if the condition of abdominal
tuberculosis is to be rightly understood.

It would be hardly asserting too much to say that in few
chronic infective diseases is a proper appreciation of the
primary causes and secondary results more necessary for the
attainment of success in treatment than in those dependent

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upon the ravages of the tubercle bacillus. It is, as has been so often and so aptly described, a conflict between two forces, a conflict, too, which must be fought to the bitter end, to the complete defeat and annihilation of one or other combatant. The whole art and science of medicine is ranged, from the very outset of hostilities, on the side of the defenders, and every effort is put forward to resist and defeat the malignant onslaught of the attacking bacilli. As exercised at the earliest stages of the battle, these forces are of the protective type, and may be said to be found more in the weapons of medicine than in those of surgery. But as the strife waxes keener, and the various natural defences and protective barriers give way under the aggressive march of the besieging bacilli, so that the very citadel of life itself becomes in danger, more active measures have to be employed. Surgical intervention steps in and seeks by purely mechanical and physical means to remove —it may be at the sacrifice of certain regions or organs—those parts which have been worsted in the strife, and whose very existence may be a menace to other parts more vital. Such is the somewhat graphic picture which it is now usual to draw in attempting to depict the infective nature of tubercular disease (1). And while it represents fairly well the life history of the disease in every and any part of the body, it is perhaps more truly illustrative of the disease as it is met with in the respiratory organs and in the intestinal canal.

It is not proposed in these general remarks to enter into detail upon those questions which will find a more fitting place for discussion under the affections of particular abdominal organs or regions ; but there is one question—the first of those above enumerated (1)—which has so universal and general an application, that it may properly, and with advantage, be enlarged upon here. It concerns the primary source of the bacilli : from whence do they come to infect the human system ?

It seems to be generally accepted that there are only two main sources of supply—the one human, the other bovine. To what extent each is responsible is one of the knotty and disputed questions of the hour.

It will be remembered that Koch (2), in his address to the British Congress held in London in 1901, promulgated the opinion that bovine tubercle bacilli were different from human tubercle bacilli, and that they were only doubtfully

communicable to human beings. This opinion awakened at the time quite a storm of opposition, and was very warmly rebutted even by the chairman himself, Lord Lister. And yet there is now a gradually growing concensus of opinion that the assertion was not, after all, so remote from facts. Kossel, Weber, and Heusse (3), in their report to the German Imperial Department, have confirmed Koch's statement that the tubercle bacilli derived from bovine animals differs from the bacilli derived from man; and they have further failed to find any evidence that the one type can be transformed into the other. An examination by these observers of tubercular material from fifty-six cases of men, women and children, revealed only six instances in which the *typus bovinus* existed. In every one of these it was noted, also, that the patients were children under seven years of age. In five of these the affection appeared limited to the intestines or mesenteric glands. In the remaining one the case was one of miliary tuberculosis. As still further bearing on this question, and tending to support the opinion that in most instances the source of the bacilli is not of bovine origin, are the statistics published by Kitasato (4) the eminent Japanese bacteriologist, regarding the prevalence of disease in his own country. From these records it appears that deaths from tuberculosis are in about the same ratio to other causes of death as exist in this country. Intestinal tuberculosis is also shown to be equally as prevalent; but here is the somewhat startling, and, to wit, suggestive statement, that cow's milk for feeding children is practically unknown in Japan, for when a mother cannot feed her own child a foster-mother is acquired for it. Kitasato goes on further to state in his report that native cattle are unknown to suffer from tuberculosis, and in any instance where it has been discovered there has usually been traced a cross between the native and foreign or imported beasts. The consumption of milk in Japan is particularly small, and works out, according to Kitasato, at about two and three quarter teaspoonfuls per head per day.

These facts seem to go far towards supporting the assumption that the bacilli of the *typus bovinus* play but a minor *rôle* in the production of the disease; and that some other more fertile and frequent source must be sought for. As has been stated, however, only two primary sources are known; the alternative, therefore, can alone constitute the field in which search must

be made; and in the human being must be found the chief nidus from which the dissemination emanates. It is only just to say that this opinion has long been held by many competent observers; and it was not until Koch's statement came to shake the somewhat prevalent and popular opinion as to the possible exclusive bovine origin of the disease that the infection of human beings by human beings has come to fuller recognition. Since, however, the promulgation of this theory, it has gradually grown in favour; and the tendency now-a-days, it may be said, is steadily advancing along the line of preventative measures, which have their main object in checking the communication of the disease from one individual to another.

Since writing the above remarks, which I consider it wise still to retain, the result of other investigations have come to light, and go to show how extremely difficult it is, if, indeed, not quite impossible, to state at present with any degree of certainty, first, the true relation between the bovine bacillus and the human type, and second, the respective parts which each play in the production of the disease. Thus, the part played by the *typus bovinus* in the production of human tuberculosis has received renewed and almost startling support from the experimental investigation carried out by the Royal Commission appointed in 1901. The Commission in their ' Second Interim Report,' among other conclusions arrived at, state that " Cow's milk containing bovine tubercle bacilli is clearly a cause of tuberculosis, and of fatal tuberculosis, in man."

Again, Professor Arloing (5), in discussing the question of the variability of the tubercle bacillus at the Fourteenth International Congress of Hygiene and Demography held in Berlin in October, 1907, stated that " the more he studied the matter the more convinced he became that the bacillus of the disease in different species of animals is a single species; and that the various types that have been described are but temporary varieties of races, the apparent fixity of which does not survive the conditions of the surroundings in which they are found. He concluded (1) that the various types are rarely sharply defined; (2) that there is an infinite series of gradations between the various types; (3) that variability suffices to explain the usual characteristics of the tuberculosis of mammals and birds; and (4) that it would be dangerous to lay down any principles of prophylaxis based on an assumption of the

difference between the various types of tubercle bacilli in different animals."

How the bacilli are carried from one individual to another can only be conjectured; but there is sufficiently confirmatory evidence, gleaned from experimental research, to support the belief that the transmission is effected by bacilli-infected discharges which gain entrance to the system by some of the natural channels, and by none more frequently than the respiratory and alimentary.

Thus, then, we may take it that tuberculosis is truly an infective disease—as infective in all its phases as any other disease dependent upon better known specific microbic influences; and so far as abdominal tuberculosis is concerned, it is just as important to duly regard this infective aspect of the condition as it is deemed expedient to consider it, when, for instance, the lungs are the chief seat of involvement.

The other points which have to be considered are more particularly those questions which concern the modes of entrance of the bacilli into the system; these will be dealt with in discussing the disease as it affects each individual region. Although in many instances the seat of entrance may be, and often is, a common factor in the production of any manifestation of the disease, be it local or general, it nevertheless does occasionally, indeed, it should be said frequently, present such strikingly local characteristics that the treatment of the subject is better left for discussion as proposed, that is, under the heading of each organ or tissue as it is separately considered.

AUTHORS REFERRED TO.

1. J. G. ADAMI.—An Address "On Adaptation and Tuberculosis," 'Brit. Med. Journ.,' 1905, vol. i, p. 1133.
2. KOCH.—'Trans. of the British Congress on Tuberculosis,' 1902, vol. i, p. 29.
3. HEUSSE.—'Tuberculose-Arbeiten a. d. k. Gesundheitsamte,' Heft 3, 1905; also 'Brit. Med. Journ.,' 1905, vol. i, p. 893.
4. KITASATO.—Quoted by Adami. See above.
5. ARLOING.—'Lancet,' 1907, vol. ii, p. 989.

CHAPTER II

ABDOMINAL TUBERCULOSIS

WHILE it has become somewhat customary in past years to speak of abdominal tuberculosis as if it were a disease in itself, the expression, in the light of modern pathological knowledge, has come to assume a degree of vagueness which renders it necessary that some more exact definition and explanation should be forthcoming if any attempt is to be made, such as is now desirable, to fully and properly appreciate its true significance and extent. We no longer, nor perhaps did we ever, speak seriously of thoracic tuberculosis; and yet there would almost be as good grounds for doing so as there has been assumed to be in the case of the abdominal form of the disease. But we have long known that a tubercular disease within the chest has arisen from some definite structure within this part of the body cavity; and we describe the disease as connected with the structure from which it took its primary origin. Thus it is "pulmonary" if affecting the lungs; or it is "pleural" if involving the pleura. Again it may be "mediastinal" when the lymphatic glands, the bronchi, or the thoracic tissue are the source of mischief seated in this particular region.

From this more extended view must the subject of abdominal tuberculosis be regarded. The expression should in a sense be considered as generic, embracing within it, so to speak, the different species of the disease. We shall then accept the term as simply implying, in a general way, that the intra-abdominal symptoms indicate tubercular disease of some particular organ or tissue.

If the expression "abdominal tuberculosis" has any modern acceptance, it is in those cases where the whole abdominal cavity presents sufficiently obvious manifestations that the disease appears to have extended beyond purely local limits. But regarding these conditions in the light of the reasoning

above adopted, these cases are really instances of a particular tissue being involved ; or expressed more exactly, the peritoneum of both the viscera and the parietes is attacked by the disease, and that we have before us the condition of tubercular peritonitis.

It will thus be understood that the term as it will be used in the present work will signify nothing more explicit than that a disease of a tubercular nature is situated within the abdominal cavity. It implies no specific limitations, and embraces as much a localised tubercular ulcer of the intestine as it does a general tubercular peritonitis. On these grounds it might be argued with as much reason that the term should be abolished as has been that of thoracic tuberculosis, or, at least, that it should be as little employed as that expression. But there is this marked difference, that with the thorax the organs and tissues are comparatively few, and, therefore, the source of origin of the disease differentiated with but little difficulty. Not equally so is it with the abdomen. Here there are many organs and tissues which may become primarily affected, and from any one, such extension may take place as to readily mask the true focus of the disease. Differentiation, therefore, becomes in many cases a matter of extreme difficulty; and a term is needed that, while it expresses the true nature of the disease, does not commit the diagnosis to a particular organ or tissue.

It must not, however, be thought that the difficulties are quite so great as such a contrast between the thorax and the abdomen might lead one to suppose. Many as are the organs and tissues within the abdomen—and here it must be remarked that by the abdomen is meant to be included all the parts contained within the pelvic cavity—yet it is only a few that are really the source of sufficient trouble to entitle them to be recognised as producing symptoms of abdominal tuberculosis. Thus we know, both from pathological and clinical experience, that certain abdominal organs are comparatively rarely infected with tubercular disease ; and that others, although frequently involved, and even extensively, do not give rise to symptoms which could, with any degree of justice, be classed as abdominal. Thus, for instance, the pancreas, stomach, and duodenum appear to be peculiarly exempt from infection; and when they are involved it is comparatively rarely as a primary condition, but as a part more or less of a general infection

embracing the body as a whole, or simply other regions
remotely situated from them.   And again, such isolated
instances as do occur of these organs being implicated in
disease of any extent, rarely, if ever, lead to such extension
and prominent manifestations that would admit of their being
considered abdominal exhibitions of the disease.   On the other
hand, we have in the kidneys, and in the urinary system as a
whole, embracing the ureters and the bladder, organs that are
frequently and gravely attacked ; and notwithstanding their
intra-abdominal situation, the symptoms which arise in connec-
tion with affections of these organs are rarely such as in
themselves to produce indications of abdominal disease.   And
not in the most advanced stages of renal, ureteral or . cystic
disease, is it customary to find infection of the general
peritoneal cavity as a subsequent complication from extension.
We are thus, after all, reduced to practically a very limited
field for investigation ; and in disease of the intestinal canal—
with such parts as are anatomically and physiologically
associated with it—and the female pelvic organs, we have the
principal sources of all so-called abdominal tuberculosis.   To
what extent the peritoneum itself may be primarily attacked
will be considered later; but it may be briefly mentioned here
as probably adding yet another source of the particular phase
of the disease under discussion.

The field, therefore, of abdominal tuberculosis practically
becomes reduced to comparatively narrow limits; and yet
within these limits are problems of no mean difficulty to solve,
embracing questions of etiology, pathology, diagnosis, prognosis
and treatment, as intricate and obscure as any that the
physician, surgeon or pathologist is likely to encounter.

In dealing with the subject I propose to devote more parti-
cular attention to those parts which are, in our clinical and
pathological experience, the ones most frequently the source of
abdominal symptoms ; and from the initial lesion pass on to the
various extensions and complications likely to arise as the
disease advances.   Towards this end, therefore, the intestinal
canal far and away demands first attention; and with it will be
associated such other structures as are functionally connected
with the alimentary system.   Later will follow the female
pelvic organs ; and lastly, the subject of tubercular peritonitis
with its many and grave after-effects.

The question of treatment usually finds no place at the beginning of a discussion on disease, nor do I intend to say much about it here; but the treatment of tuberculosis, in its most extended sense, is a peculiarly complicated and, withal, important consideration. For, coupled with every local remedial measure employed for the relief of certain definite seats of disease, there is always the combat with the bacilli which must be exercised through the system as a whole. This, in the treatment of an infectious disease like tuberculosis, opens up, therefore, the important subject of immunisation by the employment of antitoxins; and comprises all other measures which have as an end the strengthening of the system against the onslaught and spread of the bacilli. The bearing of all this upon the subject of abdominal tuberculosis will be at once understood; and while I propose, in dealing with the various foci of the disease in different organs and regions, to speak only specifically of the local treatment required, it is my intention to conclude with a chapter which will embrace, more or less comprehensively, the measures that must be carried out in the treatment of the disease, no matter where or what its local manifestations may be; and that, too, I repeat, quite independent of all local treatment.

CHAPTER III

TUBERCULOSIS OF THE STOMACH

THE stomach ranks with the œsophagus and the duodenum as being a section of the alimentary canal very rarely attacked by tuberculosis. Such interest as attaches to the subject centres more upon the pathological aspect of it than upon the clinical; and for what knowledge we do possess regarding the disease we are indebted rather to the teaching of morbid anatomy than to any specific manifestations which are presented during life.

The stomach may be infected primarily or secondarily. In by far the larger number of cases, however, the disease is secondary; that is to say, it has already obtained a firm and extensive hold of the system, and manifested itself in the form of gross lesions elsewhere before involving the stomach.

There are three different forms in which gastric tuberculosis may present itself: (1) Diffusely scattered miliary tubercles; (2) single ulcer; (3) multiple ulcers. The commonest form is the first. Military tubercules, often as part of a generalised tubercular peritonitis, are found abundantly scattered throughout one or all of the three tunics of the gastric parietes. These are sometimes found so closely associated together as to form yellow nodular masses of caseating material, rarely, however, of any considerable magnitude. This particular condition is well represented in the two illustrations (Figs. 1 and 2). The portion of the stomach shown in Fig. 1 was photographed from a specimen in the Museum of St. Bartholomew's Hospital (No. 1882). It was removed from a lad who died with tubercle in his lungs and in several other organs. Small oval masses of tubercular matter are seen deposited beneath the peritoneal coat. Fig. 2 shows a somewhat similar condition, only the nodular masses are more numerous but not so large. The photograph was taken from a specimen in the Museum of

Guy's Hospital (No. 1214).   The anterior wall of the viscus is shown with its serous coat studded with masses of caseating tubercles of various sizes.   The Museum catalogue describes the specimen as taken from a boy who had ascites, from which it may be inferred that he had a general tubercular peritonitis. This seems the more likely also, inasmuch as the description further states that the mucous membrane was unaffected.   There

Fig. 1.—Masses of tubercular material in gastric parietes.
(St. Bartholomew's Hospital.)

is another interesting specimen in the same Museum (No. 661), which shows the greater curvature and posterior wall of the stomach to be considerably thickened by a deposit of caseous material beneath the serous coat.   As in the preceding case, the mucous lining of the organ was unaffected.   The patient from whom the specimen was removed *post-mortem* had tubercular peritonitis; the peritoneal cavity was found to be

obliterated by adhesions, and there were numerous ulcers in the ileum. The age of the patient was thirty-eight years.

Ulceration, the other form of tubercular affection, presents itself either as a solitary process or as multiple lesions. The existence of a solitary ulcer of any large size is much less frequent than a comparatively diffuse sprinkling of small lesions over different parts of the internal lining wall.

From various published statistics, tubercular ulceration of the stomach would appear to be much more frequent in children than in adults; perhaps for no better reason than that the disease itself, in some shape or form, is so common during the earlier periods of life. It is always found in association with tubercular disease elsewhere. Still (1) met with it in 5 out of 206 autopsies in children with abdominal tuberculosis. Four of these were in children under four years of age, one of the age of ten months. Holt (2) also met with 5 cases out of 119. Lister (3) appears to have met with a high percentage of cases; out of forty-two autopsies of abdominal tuberculosis gastric ulceration was found in four; two of these were in infants under one year.

The occurrence of tubercular gastric ulceration in the adult, if not so frequent, relatively to the appearance of other manifestations of systemic disease, as in the case of childhood and infancy, is, nevertheless, judging by the numerously recorded cases, of not such rarity as usually supposed. The ulcers, however, resemble those found in early life in being nearly always secondary to disease elsewhere; and in most instances the manifestations of the systemic infection are of a particularly advanced and widely distributed character.

The literature of the subject, considered from all aspects, has been thoroughly well worked up by Alice Hamilton (4), G. F. Still (1), and T. D. Lister (3). I shall limit my description of the disease mostly to a few very striking examples culled from these and other sources.

Dr. Alice Hamilton's (4) cases were three in number, all occurring in " coloured " patients : one, a female, aged thirty years ; a second, a male, aged fifty years ; and the third, a girl, aged eleven years. In the first case, in addition to a very general visceral distribution of the disease, including numerous ulcerations in the small intestine, " the stomach showed a large number of losses of substance, from 115 to 120, scattered

over the entire organ, but most thickly in the anterior aspect near the greater curvature. These ulcers were round or oval, usually smaller than a penny, with rounded thickened edges, generally smooth or undermined for a variable distance."

In the second case the disease was almost exclusively thoracic, the intestines being free from ulceration. " The mucous membrane of the stomach was congested, and covered with sticky mucus; and along the greater curvature, almost over its entire extent, small losses of substance, 70 to 75 in number, occurred. They presented worm-eaten edges and
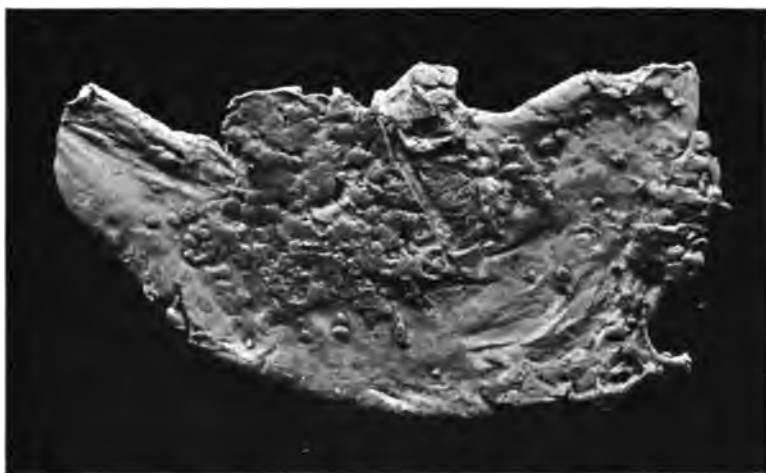
FIG. 2.—Anterior wall of stomach studded with caseous tubercles of various sizes. (Guy's Hospital.)

uneven bases which sometimes, but rarely, were covered with small granulations. They usually extended only partly through the mucosa."

In the third case, that of a girl, aged eleven years, who was admitted into hospital for tubercular peritonitis, a very wide distribution of the disease was found after death, involving almost every organ of the body. " The stomach was adherent to the transverse colon, to the pancreas, and to the mass of enlarged peripancreatic glands. The serous coat was covered with small and large caseous tubercles. Midway between the pylorus and cardia on the posterior aspect of the lesser curvature was a large, irregularly oval, crater-like erosion, 3 cm. by

2 cm. in size. The edges were raised and somewhat under-mined, and more deeply congested than the surrounding parts. The floor was irregular, the deepest part of the crater measuring 8 cm., while the remainder was formed by pro-jecting caseous tubercles. Directly behind this ulcer was a caseous lymphatic gland, so closely adherent to the stomach wall at this point that it was impossible to tell whether or not it formed the floor of the ulcer. A second smaller erosion was found above this one in the middle of the lesser curvature. Its edges were slightly elevated, and in one place deeply undermined, the floor being formed by the muscularis. Here and there scattered through the mucous membrane were minute greyish white and yellowish points looking like, but not proven to be, miliary tubercles."

In each of these three cases the true nature of the ulceration was established by microscopical examination and by the detec-tion of the tubercle bacillus.

Blümer (5) recorded the case of a woman, aged fifty years, who had generalised miliary tuberculosis with tubercular ulcers in the ileum, kidneys, and aorta. In the stomach three or four shallow circular ulcers were found near the greater curvature. The ulcers presented microscopically the characters of tuber-culosis, and contained tubercle bacilli.

Petruschky (6), of Danzig, reported at the German Medical Congress the case of a young woman who some time previously had been treated for anæmia, but had recovered. All the symptoms of gastric ulcer then supervened, including hæmor-rhage. During prolonged treatment with tuberculin the patient got well. The ulcer was considered tubercular, because after resisting all treatment it responded and showed marked reaction to Koch's tuberculin. Except that the author felt sufficiently convinced of the correctness of his diagnosis to bring the case before the Congress, one might be inclined to entertain some doubt regarding the assumed nature of the disease.

Mayo Robson (7) operated upon the case of a girl, aged eighteen years, who showed signs of tuberculosis in various ways. " There were tubercular nodules in the stomach and omentum, and the mesenteric glands were found to be full of caseous material and pus. The pylorus was nodular and thickened, and was itself the seat of tubercle ; the stomach was enormously dilated."

Somewhat on the same lines as that of Robson's case, are three cases reported by Patella (8) where stenosis of the pylorus existed. The author, however, held the view that the thickening was not directly due to a tubercular invasion of the part, but to a slow sclerosis dependent on tubercular intoxication.*

Fortescue-Brickdale (9) recorded the case of a child, aged two years, who died of general tuberculosis. The gastric lesions consisted of several round ulcers about 1 mm. in diameter, with thickened edges, situated on the posterior wall near the cardiac end of the viscus, and also two irregularly shaped ulcers of larger size, one on the posterior wall near the pylorus, and the other at about the middle of the greater curvature. In a second case reported by the same author there were numerous small ulcers, round in shape, measuring about 3 mm. in diameter, and mostly situated at the cardiac end. Two were seen close together, separated only by a narrow bridge of mucous membrane. In neither of these cases were there any symptoms during life which pointed to gastric ulceration. In both cases the primary tubercular lesion appeared to be in the mesenteric glands.

George Carpenter (10), in a discussion which took place upon the subject at the Society for the Study of Disease in Children, also refers to two cases which had come under his observation. The ulcers in both these cases were numerous, small, round, with thickened edges, and with miliary tubercles on their peritoneal surfaces. In both cases, also, there was general tuberculosis. In neither were there symptoms during life suggestive of implication of the stomach.

In the Museum of the Brompton Hospital, London, there is a specimen (No. 349) of a stomach with a small ulcer about the size of a threepenny piece. The edges were sharp and the floor caseous; tubercle bacilli were found in the caseous material. The specimen was obtained from a man, aged thirty-five years, who died of tuberculosis of the lungs.

In all the above cases there seems ample reason for believing that the gastric lesion was not primary, but a secondary manifestation in the stomach of a condition which had already got a very strong and widespread hold upon other tissues and

* See Antonin Poncet and René Leriche on " Para-tuberculous Inflammations," Chapter VI.

organs of the body.   In this connection, therefore, the follow-
ing case possesses features of peculiar interest, for there seems
little doubt, as the author himself thinks, that the case is
really one in which the disease has primarily manifested itself
in the stomach.   The case is reported by E. Ruge (11), and is
as follows : " The patient, a man, aged fifty years, complained of
severe pain in the stomach, loss of appetite, and the presence
of a swelling in the epigastric region.   His father had suffered
all his life from symptoms referable to the stomach, and a
brother had died at the age of forty-five from some disease of
that organ.   The patient had suffered for thirty years from a
tendency to abdominal pain and diarrhœa, and these symptoms
had been more marked at intervals during the two years before
he was first seen; the swelling in the stomach region had been
noticed for about four months.   During the year before treat-
ment was begun the patient had lost 30 lb. in weight.   The
stomach contents were repeatedly examined, and there was
throughout an absence of free hydrochloric acid.   The patient
was transferred to the surgical side of the hospital, and two
operations were performed : first a plastic operation for stenosis
of the pylorus, and later, on the return of the symptoms, a
posterior gastro-enterostomy, which was completely successful.
About eight months after the second operation the patient
again presented himself, this time complaining of pain in the
chest and shortness of breath.   On examination there was
pleurisy on the left side, the cardiac dulness reached to the
right border of the sternum, and over the right heart there was
an extra-pericardial rub.   The abdomen was distended and
gave a tympanitic note.   Clear serous fluid was withdrawn
from the right side of the chest on two occasions, and fluid
collected later on the right side and was withdrawn.   A little
later pain was felt in the loin, and hard, painful swellings
developed there.   The patient's weakness increased, and he
suffered from obstinate constipation and abdominal pain.
Death ensued about four months after the pleurisy was first
complained of.   The diagnosis was carcinoma ventriculi, with
many metastases.   At the *post-mortem* examination a large
tumour of the stomach wall was found, showing deep
ulceration on its inner surface.   Microscopical examination
showed that the tumour was tuberculous, and made up for the
most part of a central mass of necrosed tissue, with an outer

layer, in which typical tubercles could be seen; tubercle bacilli were present in large numbers. The ulcer of the stomach was also tuberculous. The lungs were carefully examined for tubercle, with negative results."

The peculiar and striking condition of the tubercular process manifested in this case is probably very exceptional, if not almost unique; and when the stomach does become so involved it is more than likely that the diagnosis will be, as it was in this case, one of malignant disease rather than that of tubercle.

The association of a carcinomatous and tubercular process at the same seat of ulceration is a subject that will be considered more fully when dealing with tubercular ulceration of the intestine. It would hardly be deserving of any notice here but for the fact of a case recorded by Claude (12). At the *post-mortem* of a man who died of pulmonary and intestinal tuberculosis a carcinomatous ulcer was found in the stomach, and in the base of this ulcer both giant cells and tubercle bacilli were discovered.

The type of the tubercular ulcer found in the stomach, while showing great variety in shape, size, and situation, differs considerably from the well-known chronic gastric ulcer, and in many points also from the tubercular ulcer of the intestine.

There seems to be no special seat of predilection, nor any limit to the number of ulcers which may exist at one time in the stomach. They may be found on any part of the mucous lining, and may vary between one and several hundreds. As illustrating an ulcer of exceptional size that of Simmonds's (13) case may be referred to, where the dimensions were eight inches by four inches. Examined by the naked eye the ulcer is usually found to have overhanging or undermined edges, the base somewhat granular in appearance, and the whole having a much more superficial look about it than has its prototype in the intestine. To this, however, there are many exceptions, as shown by some of the cases described above where the edges were distinctly thickened. It is doubtless in ulcers of this type that the idea has arisen that the ordinary chronic ulcer may itself sometimes become infected.

The microscope reveals the usual characteristic features of the tubercular process, and in the immediate neighbourhood of the ulcer are areas containing miliary tubercles.

As in the case of the intestine miliary tubercles are often

found on the peritoneal surface, that is to say, on that par-
ticular part of it which forms the outer wall of the involved
area.

Since Coats (14) first discovered tubercle bacilli in the
gastric ulcer, these are now always sought for as conveying the
most corroborative evidence of the true nature of the ulcerative
lesion.   The infrequency with which the stomach is attacked
by tubercular disease when compared with the intestine has
led to many speculative suggestions, in view of the fact that
where infection is through the ingesta the bacilli must pass
through the stomach on their way to the bowel.   It may,
however, be first pointed out that infection must take place in
one of two ways, either by the blood, or by direct introduction
into the cavity of the stomach.   One reason for immunity has
been ascribed to the non-existence of closed follicles—the
common seat of invasion in the bowel.   Against this, however,
Coats (14) argues that the urinary bladder has no lymphoid
tissue in its walls ; nevertheless in tuberculosis of the kidney
it becomes the seat of ulceration.   A more feasible explanation
seems to be that which assumes that the bacillus is killed by
the normal gastric secretion ; in other words, that it is probable
that the acid constituents of this juice are inimical to the
retention, for a sufficient length of time, of the bacilli within
the gastric cavity, so as to enable them to get a hold upon the
mucous membrane before being destroyed or passed on into the
bowel.   With this theory to argue from, we have to assume
that the stomach is liable to become infected when either the
gastric juice or the secretory apparatus is sufficiently impaired
to allow of the bacilli getting a hold upon the tissues.   This
impairment, again, has been attributed by some to the pro-
duction primarily of small erosions following upon ecchymoses
into the mucous membrane or submucosa.   The superficial
character and multiplicity of the lesions would seem to lend
some support to this theory ; and the frequency with which
these hæmorrhagic erosions are known to exist in connection
with various diseases renders it a very possible means of
infection in cases where the system is already deeply steeped in
the disease.   Coming somewhat under the same method of
infection is the supposed inoculation of an existing chronic
ulcer of the stomach.   This, however, must be very rare, for
the very condition which is most conducive to the formation of

a chronic gastric ulcer—hyperchloridia—is that which is supposed to be most inhibitive and detrimental to the life and development of the tubercle bacillus.

There seems little doubt that the stomach may be invaded from without, and when this does happen probably the ulcer which results partakes of the nature of a gross lesion in which all the coats of the viscus are implicated. One, if not two, of the cases above described would appear to come under this category. The third of Dr. Alice Hamilton's three cases was possibly due to the ulceration through the wall of the stomach of a caseating adherent lymphatic gland.

Little remains to be said regarding the clinical symptoms associated with tubercular gastric ulceration. In nearly every instance the patients are the subjects of pulmonary tuberculosis; and often other manifestations of tuberculosis exist elsewhere. The large ulcer described in Simmonds's (13) case gave rise to no symptoms during life; and this author expresses the opinion that when marked symptoms of gastric ulcer are present, they suggest the existence of the common type of chronic gastric ulcer rather than that of the specific form of ulceration.

The difficulty of diagnosis is further added to by the derangements of digestion which so frequently accompany the general debilitating effects of systemic tubercular disease; and when tubercular peritonitis is a concomitant of gastric ulceration, the former condition, it may be conceived, would entirely mask any symptoms which otherwise might be justly attributed to the stomach.

AUTHORS REFERRED TO.

1. G. F. STILL.—' Path. Soc. Trans. Lond.,' vol. 1, p. 76.
2. L. E. HOLT.—' Diseases of Infancy and Childhood,' London, 1897, p. 1032.
3. T. D LISTER.—' Path. Soc. Trans. Lond.,' vol. 1, p. 83.
4. ALICE HAMILTON.—' Johns Hopkins Hospital Bulletin,' April, 1897, p. 75.
5. BLÜMER.—' Albany Medical Annals,' March, 1898, and ' Brit. Med. Journ.,' Epitome, 1898, par. 504.
6. PETRUSCHKY.—' Brit. Med. Journ.,' 1899, vol. ii, p. 1042.
7. MAYO ROBSON.—' Surgery of the Stomach,' 1901, p. 243.
8. PATELLA.—' Brit. Med. Journ.,' Epitome, 1900, par. 399.
9. FORTESCUE-BRICKDALE.—' Reports of The Society for the Study of Disease in Children,' 1904, vol. iv, p. 95.
10. GEORGE CARPENTER.—*Ibid.*, p. 96.

11. E. RUGE.—' Beit. zur Klin. der Tub.,' Bd. iii, Heft 2 ; and ' Brit. Med.
        Journ.,' Epitome, 1906, par. 248.
12. T. CLAUDE.—' La Semaine Médical,' tome xix, No. 5.
13. M. SIMMONDS.—' Munch. med. Woch.,' 1899, March 6th, p. 317 ; and ' Medical
        Review,' 1900, p. 463.
14. JOSEPH COATS.—' Glasgow Med. Journ.,' 1886, vol. xxvi, p. 53.

OTHER REFERENCES.

ANDRAL.—' Prec. Path. Anat.,' ii, 178 (quoted by Wilson Fox).
ANGER.—In ' Marfan's Thèse,' Paris, 1887.
BARBACCI.—' Lo Sperimentale,' lxv, May, 1890.
BARLOW.—' Path. Soc. Trans. Lond.,' vol. xxxviii, p. 141.
BARTHEZ AND RILLIET.—' Malad. des Enfans,' iii, p. 183.
BEADLES.—' Brit. Med. Journ.,' 1892, vol. ii, p. 735.
BIGNON.—' Bull. de la Soc. Anat.,' Paris, 1853, vol. vi, p. 211.
BEDNAR.—' Krankheit der Neugebor. u. Säugling.,' tome cxvi.
BLACKADER.—' Starr's Text-book,' vol. i, p. 452.
BRECHEMIN.—' Bull. de la Soc. Anat.,' May, 1879.
CAZIN.—Fernet, ' Bull. et Mém. d. l. Soc. Méd. des Hôp.,' 1880, tome xvii.
CHVOSTEK.—' Wien. Med. Blatt.,' 1882, v.
CORDUA.—' Arbeiten aus dem Patholog. Institut in Göttingen,' Berlin, 1893.
DUGUET.—Spillman's ' Thèse,' Paris, 1878.
EPPINGER.—' Prager Med. Wochenschrift,' 1881, Nos. 51, 52.
WILSON FOX.—' Reynolds' System of Medicine,' vol. ii, p. 964.
HABERSHON.—' Path. Soc. Trans. Lond.,' vol. xlv, p. 73.
HATTUTE.—' Gazette des Hôpitaux,' 1874.
G. HEBB.—' Westminster Hospital Reports,' 1888, iii, p. 155.
HENKEL.—' Gaz. hebdom. de Med. et de Chir.,' March 31st, 1898.
KÜHL.—' Thesis,' Kiel, 1889.
KUNDRAT.—' Gerhardt's Handb. d. Kinderk.,' iv.
LABADIE-LAGRAVE.—' Bull. Soc. Anat.,' 1870.
LANGE.—' Memorabilien,' Heilbronn, 1871, xvi.
LAVA.—' Gazz. Med. di Torino,' 1893.
LETOREY.—' Thèse,' Paris, 1895.
LITTEN.—' Virch. Arch.,' 1876, Band lxvii, p. 615.
MARFAN.—' Thèse,' Paris, 1887.
MATHIEU.—' Bull. d. l. Soc. Anat.,' 1881.
MUSSER.—' Phila. Hosp. Reports,' 1890, i, p. 170.
OPPOLZER.—Marfan's ' Thèse,' Paris, 1887.
PAULICKY.—' Berlin. klin. Wochenschrift,' 1867.
PITT.—' Path. Soc. Trans. Lond.,' vol. xxxix, p. 107.
QUÉNU.—' Marfan's Thèse,' Paris, 1887.
REHN.—' Jahrb. für Kinderheilk.,' 1874, p. 19.
RILLIET AND BARTHEZ.—' Mal. des Enfans,' Paris, 1843, iii, p. 1262.
MAYO ROBSON.—' Clin. Soc. Trans ,' Lond., 1902, vol. xxxv, p. 62.
SERAFINI.—' Ann. Clin dell. Ospedal. degl'Incurab.,' Naples, 1888.
STEINER AND NEURENTHER.—Rehn, ' Jahrb. f. Kinderh.,' 1874, S. i ; also
        ' Prager Vierteljahresschrift,' 1865, Bd. ii.
TALAMON.—' Progrès Médical,' vol. iv, S. 444.
WILLIGK.—' Prager Vierteljahressch.,' vol. i, p. 80.

CHAPTER IV

TUBERCULOSIS OF THE DUODENUM

THE duodenum appears to be peculiarly exempt from invasion by the tubercle bacillus; but when it is involved the lesions resemble both those met with in the stomach and in the bowel lower down.

Such parts of the duodenum as are covered with peritoneum may present a surface sprinkled with miliary tubercles in cases of widespread tubercular peritonitis. In this condition the viscus simply takes part in an infection which implicates all similarly coated viscera.

The duodenum may also be secondarily involved, as shown in a specimen in the St. Mary's Hospital Museum (No. 307), where both it and the pancreas are imbedded in a mass of tubercular caseous glands.

It is, however, with the subject of ulceration that tubercular disease of the duodenum affords most interest.

In the first place, the extreme rarity of this lesion is probably explained by the same reasons that exempt the œsophagus from involvement. The contents of the canal pass rapidly through it, so that the bacillus has little or no chance to lodge and form a nidus for development. This is arguing on the assumption that infection is by means of the ingesta; for if it were chiefly by means of the blood circulating through the tissues, then it is difficult to explain why lesions of this part of the intestinal canal should not be as frequent as in the jejunum and ileum lower down.

The type of ulcer met with varies considerably. In one instance it may partake of the characters of the typical ulcer of the ileum. This type is well exhibited in a specimen in the London Museum (No. 1154), where there is one transverse ulcer visible resembling in all respects the tubercular ulcer of the ileum. (See Fig. 3.)

Ulcers situated close to the pylorus seem to follow more in character those met with in the stomach, and not unfrequently they exist in association with other ulcers situated in this region.   Indeed, it may be said that in nearly every instance in which a tubercular ulcer exists in the duodenum, others will be found either in the stomach or in the small intestine lower down.

Dr. Alice Hamilton (1), in her paper on " Multiple Tuber-cular Ulcers of the Stomach " already referred to, narrates the *post-mortem* of a case in which a large ulcer with caseous tubercles covering its base was found just beyond the pyloric

Fig. 3.—Tubercular ulcer of duodenum.   (London Hospital.)

orifice.   The patient was a coloured girl, aged eleven years. She was admitted to hospital for tubercular peritonitis.   At the autopsy a very widespread infection of the organs and tissues was discovered.   Two ulcers existed in the stomach, one of large size; a still smaller one was found in the cæcum, and smaller ones scattered throughout the small intestine.   T. Claude (2) made a *post-mortem* on a man, aged thirty-three years, who had died of pulmonary tuberculosis.   He found tubercular ulcers in the upper portion of the duodenum ; four other ulcers were found in the ileum.   During life the patient never showed any symptoms referable to the intestinal canal.

A specimen exists in Guy's Hospital Museum (No. 747) showing the first part of the duodenum with a small rounded

ulcer with thickened edges situated half an inch from the pylorus; miliary tubercles are visible beneath the peritoneum. The patient was admitted for chronic phthisis. Numerous ulcers existed in the small intestine.

The recorded examples of tubercular ulcer of the duodenum are necessarily few, and clinical references are extremely rare. It is doubtful, indeed, if symptoms of ulceration of this region would or could ever be sufficiently distinctive to admit of a correct diagnosis being made of such a condition; for, as already stated, the fact of disease elsewhere, in regions more accessible and more liable to cause pain and functional disturbance, would be more likely to mask any manifestations that might otherwise be revealed. We may reasonably expect that a healed ulcer of the duodenum will cause a similar constriction of the canal to that which ensues upon the same process of repair in parts such as the ileum, where they are more frequent. The case recorded by Mayo Robson (3) would seem to be an illustration of this. It was that of a feeble girl, aged nineteen years, who had been losing flesh for some time, and when seen was little more than skin and bone. " Tubercular glands were felt in the neck. The abdomen was swollen, and the stomach was markedly dilated. On opening the abdomen the pylorus was found thickened and covered with tubercular nodules which were scattered over the omentum and other viscera. Some free fluid was found in the peritoneal cavity. In laying open the pylorus to perform pyloroplasty the finger was passed into the duodenum, and encountered a stricture one inch beyond the pyloric ring. This was evidently the result of ulceration."

AUTHORS REFERRED TO.

1. ALICE HAMILTON.—' Johns Hopkins Hospital Bulletin,' April, 1897, p. 78.
2. T. CLAUDE.—' Bulletin de la Société Anatomique de Paris,' No. 8, 1896.
3. MAYO ROBSON.—' Clin. Soc. Trans.,' Lond., 1902, vol. xxxv, p. 6; also ' Lancet,' 1902, vol. ii, p. 852.

CHAPTER V

TUBERCULOSIS OF THE SMALL INTESTINE

It requires no statistics, pathological or clinical, to substantiate the practical experience of all observers that involvement of the intestines in a tubercular process stands pre-eminently foremost among the primary causes of abdominal tuberculosis. The probable method by which the bacilli gain direct entrance into the canal renders this relative frequency easily explicable. The really interesting questions connected with the subject are not so much those which concern the mode of entrance into the canal as those which refer to the actual seat of admission to the tissues. These points, however, will be better discussed under the heading of " Pathology."

By the intestinal canal is to be understood the small and large intestine and the vermiform appendix. While each of these regions requires separate consideration from the clinical aspects of symptoms, diagnosis and treatment, it is possible to include all in discussing the subjects of ætiology and pathology.

ÆTIOLOGY.

Perhaps the most striking facts which primarily fall for consideration concern the incidence of age. All the published statistics go to show the overwhelming preponderance of the occurrence of tubercular ulceration of the bowel in children, and more particularly at the earliest periods of life. And, further, when these early periods are investigated it is found that the lesion is comparatively rare in the first year of life, but gradually increases in frequency until it reaches its maximum in the fourth year, after which there is a rapid diminution. Thus it appears that the disease is most frequent at the transitional period of weaning, when the mother's milk

is substituted for other dietary, which among the poorer classes usually means anything or everything, or, as frequently expressed in their own words, "the run of the house." The intestinal canal, in this way, becomes peculiarly prone to be irritated by ill-digested products.

As showing the relative frequency with which the intestine is affected in tuberculosis in children, Sims Woodhead (1), from an analysis of 127 cases of tuberculosis in children, found that in 43 instances there was tubercular ulceration of the intestine. Walter Carr (2), in 120 necropsies made upon children suffering from tubercular lesions, discovered tubercular ulceration of the intestine in 66. W. P. S. Branson (3), out of 43 *post-mortems* made upon tuberculous children dying in the East London Hospital for Children, found in 9 cases evidences of intestinal involvement.

That the primary source of the bacillus is either from the human body or from cattle has already been discussed (see Chapter I); and it now remains to indicate more exactly the channels by which infection takes place.

The subject has to be regarded from two primary aspects, the one where the intestines are implicated as a secondary complication to disease elsewhere, and the other where the disease commences *de novo* in the bowel.

In the former case the infecting material is carried from a focus of disease situated in some other part of the body ; and this transmission is effected either by means of the blood, or more directly by the contents of the canal. In the latter case it is assumed that there is no auto-inoculatory focus in the body, but that the bowel becomes primarily infected by the virus being conveyed from some outside and independent source. The direct means of infection, however, is precisely the same as in the first instance, that is, the bacilli are conveyed to the part which subsequently exhibits the lesion, either by the blood or by the bowel contents.

Around these two theories regarding the origin of tubercular ulceration of the intestine—which may be briefly described as primary and secondary disease of the bowel—much contention has ranged in recent years. The tendency has been, however, to depart from the somewhat restricted limits at one time placed on the possible existence of purely primary disease of the intestine, and to accept its much more frequent

occurrence.   But even so comparatively recently as 1902 Koch (4) made the statement at the British Congress of Tuberculosis; " I myself remember having seen primary tuberculosis of the intestine only twice."   There is little doubt that if any given case is to be described as one of primary disease of the bowel, it must be clearly shown that no existing lesions, recent or old, are to be found in other parts of the body; or if recent lesions are discovered, they must be carefully considered from the point of view of possibly having arisen subsequent to, or as a consequence of, the disease in the bowel.   It will thus be understood that before any case of tubercular ulceration of the intestine can be considered primary, a very exhaustive *post-mortem* examination must have been conducted.

In recent years both individual examples and statistics have been published which demonstrate, on the one hand, the unequivocal existence of primary disease, and, on the other, its relative frequency.   It may be incidentally remarked, before quoting these references, that the interest of the subject has largely arisen out of the question of bovine infection through the ingestion of tubercular milk and flesh.   Of course the matter is not from this aspect entirely settled, because, as will be shown later, systemic infection through the bowel does not necessarily involve a primary lesion of that viscus.   When dealing with the subject of tabes mesenterica, it will be there shown that those glands may be primarily infected by the passage of the tubercular bacilli through the wall where no apparent discoverable lesion existed.

As a fairly convincing illustration of primary disease I may refer to one of my own cases (Case X); but perhaps one of the most striking cases recently published, and the more striking because of the clearness of the clinical history, is that by Nathan Raw (5).   Three cases are recorded, but I give the one which appears most instructive, although the other two are almost as equally distinctive.

CASE I. *Primary tubercular disease of the intestine.*

A child, aged two and a half years, was admitted to Mill Road Infirmary, on June 13th, 1903, with the usual symptoms of intestinal tuberculosis. There was great emaciation with enormous distension of the abdomen,

and diarrhœa with offensive stools. The history of the child's feeding was carefully taken. It was fed on the breast until fourteen months old, then on cow's milk, which was usually bought at a milk shop or in the street. Enlarged mesenteric glands could be palpated through the thin abdominal wall, but the lungs showed no trace of disease. The usual treatment was adopted, careful feeding, and various nutrients, but he died on September 10th, 1903, having made very slight signs of improvement. At the necropsy there was great emaciation. The intestine showed extensive ulceration of the ileum and cæcum, with enormous enlargement of the mesenteric glands. Some of the lymphatic glands on the anterior surface of the vertebræ were much enlarged, but the viscera were not affected, and the lungs appeared to be quite healthy. There were two recent perforations near the cæcum with local peritonitis.

Regarding the relative frequency of tubercular disease of the intestine, the following published statistics may be given : Wyss (6) in 123 autopsies in children found 3 cases of primary tubercular deposits in the intestine where death had taken place from other causes. William Hunter (7), out of 5142 necropsies held at the public mortuary in Hong Kong, found only 13 cases of involvement of the intestine. In 8 of these the condition was regarded as secondary. In only 5 cases could the condition be regarded as primary, and all these were children under five years of age. J. Ipsen (8), in his investigations, regarded tubercular lesions in the intestines or glands, or both, and none elsewhere, as evidence of primary intestinal infection ; he also considered cases of extensive or undoubted old standing tubercular lesions in the intestinal tract, when there were fresh foci in other organs, as equally suggestive examples of primary disease. From the extreme care taken in the examinations these statistics may be considered among the most reliable. Thus he remarks, " The whole intestinal tract was minutely examined inch by inch. The method of Heller of cutting along the mesenteric border without separating the organ from the mesentery was carried out. Each gland was carefully handled, and also the lungs and other organs. All, even slightly suspicious material, was subjected to microscopical examination." Of 102 children dying of various acute infective diseases, 28 revealed signs of tuberculosis, and of these 6 had primary intestinal disease. By the addition of 85 other cases, making a total of 187 cases of children up to

fifteen years of age, 10 had primary intestinal tuberculosis, that is, 17 per cent. of tubercular children were affected with primary intestinal lesions. In finally discussing the question of infection by means of the bovine or human tubercle bacillus, some were regarded as unquestionably the result of the ingestion of cow's milk, while the probable source in other cases was contact with tuberculous patients.

In dealing with this question of tuberculosis of alimentary origin, Bonome's (23) investigations, from the fact of their being so extensive, and among also the most recent, may be lastly quoted. From 1889 up to 1907 he had made 4224 autopsies ; of these 769 were cases of tuberculosis, and 126 (out of the 769) were examples of primary tuberculosis of the intestine.

In examining more closely the various modes of infection, it is possible to conjure up several sources and means of conveyance of tubercle bacilli into the alimentary canal. First there is infected milk, to which, however, as has been shown (see page 3) a somewhat diminished importance—comparatively speaking—is being attached. Upon this point, therefore, nothing further need be said as the relative importance of bovine tuberculosis as contrasted with the human disease has already been discussed (see page 4). Of probably much more potent influence is the human tubercle bacillus derived either from the patient—auto-inoculation—or from another patient—hetero-inoculation. In the former instance the swallowing of bacilli-laden sputum ranks as the most frequent cause ; and in support of this is the number of cases in which tubercular ulceration of the intestine is met with in association with phthisis. Coats (9), in discussing this association, gives as high a proportion as two out of every three cases of death from pulmonary consumption.

The swallowing of bacilli derived from outside sources is either by dust-contaminated particles gaining access to the mouth and upper air-passages, or by solid matters conveyed by the fingers directly into the buccal cavity. While both children and adults are equally liable to the former method of contamination, it is more probable that children alone are infected by the latter. A child crawls on the floor, and, from instinct or acquired habit, constantly puts its fingers into its mouth. It will thus be easily seen how material contaminated

by tubercular sputum expectorated upon the ground may, in the form of dried particles, be swallowed.

The next point of interest in discussing the subject of ætiology is the possible bearing of predisposing influences in the production of the disease. From all that we are able to glean from our knowledge of the origin of tubercular disease in many other parts of the body, it seems right to presuppose that some impairment of the normal functional activity of a part is necessary before the bacillus can find a suitable nidus for development and the production of those changes which go to form, what we are accustomed to regard, a tubercular lesion. That some sort of preparation of the part is necessary seems to receive striking support from a case reported by Guthrie (10). The case was that of a child, aged seven years, who died with such extensive tubercular disease of both lungs that "both apices were converted into hollow shells." She was never observed to expectorate, and must therefore have swallowed an enormous quantity of infective material. Nevertheless, there was not the slightest trace of intestinal ulceration, and the mesenteric glands were perfectly normal. A few nodules in the spleen were the only signs of abdominal tuberculosis.

The additional fact, also, that the tubercle bacillus is found circulating in the blood of those who take charge of consumptive patients in some of the large sanatoria, and yet who, in all other respects, manifest a state of excellent health, still further supports the contention that something more than the mere presence of the bacillus is needed in order that it should exercise its baneful effects.

The injury, for such it may be considered, from which the bowel is liable to suffer, is that produced by certain irritating products in the canal, either directly ingested or indirectly the result of faulty digestion. Prolonged constipation and the presence of foreign bodies would come much under the same heading. In this way an inflammation of the mucous membrane results, and the sticky mucus secreted, as well as the probable proliferation and casting off of epithelial cells, constitute suitable media for engaging and detaining the bacilli. Thus entrapped, the bacilli also find in these products suitable material for their growth and development. Such a course of events seems to fit in well with the frequency with which the disease is met with in early life, at that period when intestinal

disorders of an irritating and inflammatory kind are so common.

Apart from the infection of the bowel as the result of some simple inflammatory condition arising from the irritative effects of the ingesta or secreta, there is the weakening effect of other causes, such as specific fevers. As illustrative of a predisposing cause of this nature, Hansemann (11) cites numerous cases of secondary infection of inflamed tissue with the tubercle bacillus. One case is that of a phthisical patient with typhoid fever, in which there were found recent tubercles on the base of a typical typhoid ulcer. Another cause which, though probably very rare, can hardly be left out of count, is mechanical traumatism. Just as we are familiar in the case of bones and joints of a comparatively slight injury being followed some time afterwards with a development of tuberculosis in the part, so there is just reason for believing that mechanical injury to the bowel wall may so temporarily impair the vital resisting power of its tissues that they may subsequently develop a tubercular lesion. This supposition is supported by the instances that have been observed of the bowel in an old hernial sac being alone infected when no other part was noticed to be involved. McArdle (12) has given expression to such a possibility happening, Brunns (13) records a case, and N. Senn (14) published a series of thirteen cases where there was tubercular affection of the bowel and hernial sac.

Crowder (15) records the case of a man, aged fifty-four years, who fell and received a blow in the right inguinal region. Succeeding this there was pain upon walking which radiated down the leg. Later there appeared a swelling in the right groin. Abscess formed in this region and was opened; a fistula remained. Death followed a year later, when a tubercular ulcer of the cæcum was revealed. (For a fuller description of this case, which presented other features of interest, see the discussion on ileo-cæcal disease, Chapter X.) Suchier (16) relates a case in which a specific traumatic influence seems to have played the part of cause and effect. The patient was an agate grinder, and the nature of his trade involved more or less constant pressure upon the abdomen for about twelve hours daily.

F. M. Caird (17) records a somewhat interesting case, where it was believed that a tubercular ulcer arose as the result of

a rent in the bowel wall produced at a previous operation performed for the removal of a tubercular stricture in the large intestine.

It is equally probable in the class of cases just discussed that, as in the case of bones and joints, the infection of the injured parts may be through the blood. The injury sufficiently weakens the resisting power of the tissues, so that should bacilli be circulating through the blood of the part at the time they find a condition of things suitable for their lodgment and multiplication. Although the greatest importance has been attached to the infecting possibilities of the contents of the canal, it must always be remembered that the blood in many cases may have been the medium of transmission, even in those patients who are known to have swallowed tubercular bacillus-laden material.

The possible congenital origin of intestinal tuberculosis is probably too little known about to deserve more than just a passing reference ; and this remark equally applies to latent tuberculosis. But it may be briefly noted that a few cases have been recorded which sufficiently attest to the congenital origin of the disease. To cite only two, Harbitz (18), of Christiana, refers to the death of two children, one aged nine days and the other three weeks, in both of whom tubercular lesions existed; and Martha Wollstein (19) quotes the death of a child, aged nineteen days, born of an extensively tuberculous mother, which also exhibited tubercular lesions.

PATHOLOGY.

The first point of interest in considering the pathology of tubercular ulceration of the intestine is the locality of the lesion, why certain regions should be more often involved than others. One striking feature is the apparent predilection of the disease for those parts of the canal where anatomically exist the solitary glands and follicles. It is as if these collections of lymphoid tissue caught and retained the bacilli, much as do the lymphatic glands in other parts of the body ; that is to say, when inflamed or unduly irritated in their efforts to discharge their normal functions of acting as guards and filters against the absorption of septic material, they become, or produce, a suitable pabulum for the nourishment and growth

of the bacilli. Inasmuch as this lymphoid tissue finds its anatomical seat most abundantly in Peyer's patches and in the solitary follicles, it stands to reason that the lower portion of the ileum, the cæcum and the appendix would be the parts where the disease should be most frequently found. Another possible predisposing cause for the selection of these particular regions is the probable slowing down of movement of the fæces which takes place here, amounting often, in the case of the cæcum, to a condition of stagnation. Thus it may be conceived that under such circumstances the mucous membrane would be prone to become over-irritated and perhaps inflamed; and adding to this the necessarily prolonged retention of the bacilli, we have all the conditions most suitable for the fixation and development of these micro-organisms.

In considering the particular nature and characteristics of the intestinal lesion, it has to be borne in mind that very few pathological processes, which owe their origin to specific infecting agents, are the result of an unadulterated action. This particularly applies to those processes usually regarded as tubercular. Indeed, it may be said that the grossness and acuteness of any so-called tubercular lesion is very largely dependent upon the co-existence of other micro-organisms capable in themselves of causing necrosis of tissue and active inflammatory changes. There are probably very few tubercular processes which have reached to any degree of magnitude which do not sooner or later become materially altered or affected by the admixture of pathogenic, and more particularly pyogenic, micro-organisms. In the earlier stages, however, and sometimes throughout the process, the prevailing influence of the tubercle bacilli can be traced; and we come to regard certain manifestations as typically tubercular in character and appearance.

The first changes usually effected by the entrance of the tubercle bacillus into a part is shown by a certain amount of swelling. The follicles become enlarged, and when a Peyer's patch is infected it is sometimes noted that only at certain points are there small round prominences standing out from the other unaffected parts. These swellings appear not to be of the ordinary inflammatory kind, but when sectioned show small circumscribed areas containing the typical and characteristic giant cells. As these small collections of cells become

more numerous they coalesce, and then, instead of a small pin-head tubercle, there arise masses of variable size and shape. (See Fig. 4.) If, again, these larger masses are sectioned, a considerable amount of necrosis, or, as it is termed, caseation, will be found to have taken place; that is to say, in place of well-shaped cells there is a quantity of granular material, mostly of the character of fatty *débris*, seen in the central portion. If the process is to extend further, and ulceration result, it is probable that other micro-organisms enter and assist in the destruction of tissue. Notwithstanding this, however, the ulcer which forms is of a somewhat typical character. It becomes shaped like a crater with a thickened indurated base, and irregular overhanging edges. (See Fig. 5.) The tendency is for the process of

FIG. 4.—Tubercular masses of the intestinal wall, seen in section.
(St. Thomas's Hospital.)

ulceration to extend superficially rather than deeply, and to take a course round the bowel rather than along it, following the course of the arteries, so that occasionally an ulcer is met with completely encircling the gut. (See Fig. 6.) The chronic inflammatory process which advances with the process of ulceration so thickens the base of the ulcer that perforation rarely follows; for not only is the floor thickened rather than thinned, but neighbouring parts become glued to it, and so more effectually help to seal up any tendency to rupture. Although the tubercles which were probably in the van of the necrotic process disappear, numerous others form in the outskirts, and a section of the edge or the floor of the ulcer will reveal numbers. When the peritoneal surface has been reached, numerous little white nodules make their appearance on its outer side, and these, when seen, may

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FIG. 5.—Tubercular ulceration of the small intestine.   (St. Thomas's Hospital.)

be taken as unequivocal indications of the tubercular nature of the lesion.   (See Fig. 7.)

In some cases the tubercles undergo suppuration, and small abscesses are found situated beneath the mucous membrane.

FIG. 6.—Tubercular ulcers of the small intestine.   (Middlesex Hospital.)

These may be exclusively tubercular, or they may represent the same conditions as are more frequently and clearly observed in the tubercular infected glands of the neck, and are due to the same cause of mixed infection.

Another pathological condition often co-existent with tuber-

cular ulceration, and either the cause or consequence of the infection, is acute, subacute, or chronic catarrh of the bowel, the mucous membrane showing the usual characters of such a condition.

The later and more advanced lesions connected, either directly or indirectly, with the tubercular process will be discussed separately and in a subsequent chapter, for these pathological conditions give rise to a train of symptoms distinct from those which may be expected in the earlier stages of infection, and associated, more or less, with such lesions as above described.

SYMPTOMS.

The symptoms which arise in connection with tubercular intestinal disease depend mostly, if not entirely, upon the stage to which the condition has advanced, and naturally, also, to the extent of involvement. From the gravity of the lesions usually found at the earliest appearance of symptoms, it is very doubtful whether the initial deposit of tubercles causes any appreciable disturbance. Indeed, it would seem as if the stage of ulceration must be reached before the patient becomes cognisant of bowel trouble. Whatever of the bowel contents passes over the abraded surface must irritate it, and no doubt certain agents, either taken as food or formed as secretions, are more fruitful sources of irritation than others. And it is equally fair to assume that some tubercular ulcers are more irritable than others. Thus it can be well understood that the grossness of the lesion, embracing both depth and superficial extent, does not always determine the acuteness of the symptoms.

The two leading symptoms are abdominal pain and diarrhœa, nothing the least distinctive in themselves of intestinal tuberculosis, but often sufficiently significant in the light of later developments. The pain may be intermittent and griping in character, indicative of an effort on the part of the bowel to rid itself of contents which are irritating the ulcerated surface. Palpation of the abdomen may also give rise to pain, and an area of exaggerated tenderness, converted into pain by deeper pressure, suggests a spot in which ulceration exists.

The diarrhœa may be transitory, occurring for only short

FIG. 7.—Miliary tubercles on the peritoneal surface of the floor of a tubercular ulcer of the small intestine.   (St. Thomas's Hospital.)

periods, or it may be prolonged; and in the latter case it is often of a very intractable character, resisting all efforts at remedial treatment.   Again, it may be of an intermittent character, associated with interludes of attacks of constipation. The fact also that aperients given to relieve the constipation are not infrequently followed by a period of looseness of the bowels, tends to support the possible existence of a chronic inflammation or ulceration of the intestine.   The stools sometimes contain blood, rarely in any quantity, often more in the form of streaks mixed in with the motions when loose, or on the surface when formed.   Emaciation is not an infrequent accompaniment of prolonged diarrhœa; and when the abdominal parietes have become thinned it is often possible, especially in children and young adults, to detect enlargement of the mesenteric glands.

As the lesion advances, and other and different changes are produced, new trains of symptoms arise.   These, however, are sufficiently distinctive in themselves to need separate treatment, and will be described in subsequent chapters.   The association of mental disturbances with prolonged ulceration of the bowel has been referred to by Mitchell Clarke (20).   He records the case of a man, aged twenty-nine years, who possessed marked symptoms of nerve derangement, which took a typical hypochondriacal form.   His illness had commenced three years previously, and it was only latterly that he had become depressed.   His family history was in all respects good.

DIAGNOSIS.

Nothing is more difficult than to distinguish between the different forms or various causes of diarrhœa which occur during the earlier periods of life.   Neither the colour nor the consistence of the motions in many cases present any features of distinctive peculiarity, except that the presence of strings of mucus streaked with blood may suggest ulceration where there is nothing else to indicate any very acute mischief. The chronicity of the complaint, however, as indicated by the obstinate persistence of loose motions : the alternations of diarrhœa and constipation ; and the failure by remedial measures to obtain any permanently good effect, may all be taken as possibly indicating tubercular enteritis.

The severity of the symptoms need not necessarily be any gauge of the extent of the tubercular process ; for, as already indicated in describing the pathology of the disease, the effects of an ulcer may be to set up a considerable amount of inflammation extending for some distance beyond the actual seat of the lesion; so that it is quite possible to have symptoms suggestive of a widely distributed intestinal catarrh, which would entirely mask whatever symptoms might arise from the tubercular process alone.

Gradual emaciation is an important diagnostic symptom, although more significant of tuberculosis generally than of the lesion in particular. For it has to be remembered that tubercular affections of the bowel are often associated with, and, indeed, as often dependent upon, pulmonary disease. The swallowing of infected sputum, it has already been stated, is a fruitful source of tubercular enteritis.

The family history is not unimportant, for a predisposing cause may always be said to exist where some other members of the family, and more particularly the parents, have been, or are known to be, affected with some form of tubercular disease.

The presence of the tubercle bacillus in the motions would prove, under certain conditions, the most confirmatory evidence of the nature of the affection. Sawyer (21) urges the importance in suspected cases of examining the mucus for bacilli taken from just above the sphincter ani. In this way he claims to have found them in several cases where they could not be detected in the sputum, or when the sputum could not be obtained. It must, however, be noted that the finding of tubercle bacilli in the stools, as just indicated, may mean nothing more than that they exist in the swallowed sputum, and in no sense imply disease of the bowel. It is unlikely that those bacilli which are associated with a tubercular lesion in the intestine are ever shed in any abundance into the motions. When, therefore, found, it will rather be by a process of exclusion that one will be permitted to say that they have come from the bowel and not from some other source. The best way to search for the bacilli when mixed with the stools is, according to N. Senn (14), to dilute the fæces with distilled water, and to prepare and strain the deposit after centrifugation.

The employment of injections of tuberculin for diagnostic purposes is a method which might be considered. A general reaction, as shown by pyrexia and nausea, restlessness and other toxic symptoms, would suggest the possible nature of the disease. Baer and Kennard (22), who have tested the value of tuberculin for diagnostic purposes, recommend an injection of 6 mg. "The minimum dose needed," they say, "varies, but rarely exceeds 6 mg.; this should be injected deep into the deltoid, and care must be taken to use reasonably fresh tuberculin, as failure is likely to follow the use of stale material. The technique is simple, and in no case has any harmful result been apparent." The value of determining the opsonic index as a means to diagnosis may also be considered; but as this will be more fully discussed in dealing with disease in the ileo-cæcal region reference should be made to Chapter X.

PROGNOSIS.

No sequelæ to a disease are better known than those which may follow upon intestinal tuberculosis, yet none are more difficult to predict. A very simple and transitory intestinal disturbance may be the precursor of serious and even fatal after-effects; while, *vice-versâ*, a serious and prolonged derangement may end in complete and permanent cure. The explanation and sole reason of these differences turns upon the extent of the bowel involved. Thus a solitary uncomplicated ulcer may cause no immediate symptons of gravity, and yet some years later lead to sudden perforation or acute intestinal obstruction. On the other hand, a comparatively slight ulceration may be accompanied with very extensive and widespread catarrh, causing severe and protracted symptoms yet leaving little or no ill results.

So little, therefore, can be concluded from symptoms that the future of any case solely depends upon the nature of the pathological lesion; and as we can often have but little knowledge of the nature of the process which is going on, or the extent to which that process has reached, we are quite unable to foretell the future course which any case in its early stages may pursue; and even suppose we were able to gauge the limits to which a certain lesion had extended, we should still

be in a difficulty regarding the time when future symptoms might be expected as a result of the later processes. Notwithstanding, however, what has been said regarding these various difficulties, both as to the uncertainty of the symptoms and the variableness of the lesions, it may be taken as a general truth that, given an undoubted case of tubercular disease of the intestine, the longer and more severe the primary attack the greater the likelihood, at some more or less distant period of life, of complications. It will be usually found that a patient, completely recovering from bowel symptoms at the period of the initial attack in early childhood, will remain free from any further trouble for some years. It is not, as a rule, until young adult life has been reached that the results of stricture, bands, and adhesions begin to make their presence felt. The interval, however, is not free from risk, for as in other parts of the body wherever tubercles exist, dissemination may at any time take place, and the patient become the subject of a more extended localised lesion, or a diffuse generalised miliary tuberculosis. In the case of intestinal tuberculosis there is never freedom from the possibility of tubercular peritonitis arising; and this particular complication may be said to hang, like the sword of Damocles, over the heads of all patients suffering from this kind of disease.

The question of prognosis is very materially affected by the conditions of life under which this class of patient lives. So long as these conditions are favourable, there is reasonable hope that no advance or recrudescence will take place; and the chances increase, in this respect, the older the patient becomes. Given, however, exposure to such influences as inefficient and bad food, close and vitiated air, and, in general, everything that conduces to a reduction of the resisting powers of the system, there is then every reason to expect that, sooner or later, fresh manifestations of disease will appear.

TREATMENT.

There are two primary considerations in the treatment of intestinal tuberculosis. The first concerns all such measures as tend to support and fortify the system generally against the onslaught of the bacilli. The second has reference to such

remedies as may be considered to act more directly upon the existing lesions.

There is, however, much overlapping in the relation which these two considerations bear to each other. For all practical purposes the subject may be regarded from the point of view of a general disease and a local disturbance. In the former case the treatment follows in the lines employed for tuberculosis anywhere and everywhere throughout the body, no matter what the form taken by the local manifestation. Whatever we may deem expedient in the case of pulmonary tuberculosis we should equally employ in the intestinal form of the disease. So that the old stock remedies—as important as ever they were—of fresh air, good food and tonics, are essential to the prevention of the growth and increase of the bacilli, by increasing the healthy resisting powers of the system both locally and generally.

Regarding the more specific remedies, such as the use of the antitoxines, little will be said here, as this particular aspect of the subject will be found fully discussed in the last chapter.

Inasmuch as we are dealing with an intestinal disorder, the question of suitable food is pre-eminently important. Due consideration must be given to the employment of such materials as will contain the most nourishing and most easily digestible ingredients, and be as free as possible from all irritating properties. For if the disease has reached the stage of ulceration rest to the part is requisite, both from the point of view of movement, as in normal peristalsis, and from that of the passage of material over the abraded and possibly inflamed surface. Towards this end, therefore, fluid nourishment is better than solid; and as these patients are so frequently children, no better medium exists than milk. Combining, as it does, in the most suitable proportions all the three primary ingredients of a highly nourishing food, it should be administered freely. Indeed, it may be given to the exclusion of every kind of diet; and if not distasteful to the patient, nor difficult of gastric digestion, as it sometimes is, it should be continued as long as the patient can be kept in bed or on a couch in the open air.

As regards medicines, possibly the less these are depended upon the better, for it is always doubtful whether that taken by the mouth, and which is known to act as a sedative or

stimulant upon the upper parts of the alimentary canal, effects similar influences upon the lower segments. Subjected, as all remedies are, to the action of the various juices secreted by the stomach, intestine, liver, and pancreas, they are only too likely to be materially altered in their chemical constitution before they reach the region upon which they are intended to act. There are, however, certain conventional remedies employed, and these may be tried if desired. Thus, Dover's powder in doses of $\frac{1}{30}$th to $\frac{1}{10}$th of a grain, combined with logwood, ipecacuanha and chalk, may be given every two hours. Various astringents, such as lead, tannin, gallic acid, alum, etc., are sometimes useful. Nitrate of silver, $\frac{1}{50}$th to $\frac{1}{30}$th of a grain, in two drachms of distilled water (dark bottle), given every two hours, is recommended by Jacobi. Bismuth administered in doses of two to ten grains every hour or two is another commonly employed remedy, and Goodhart recommends tincture of coca, of from five to twenty drops, taken at frequent intervals.

The question of operation will doubtless, on first thoughts, seem somewhat foreign and out of place in the matter of treatment, and yet a little deeper consideration will, I venture to think, render the proposal not so unreasonable as at the first blush it would appear. In view of the almost inevitable formation of stricture—not to speak of the various other possible sequelæ—it would seem by no means out of the way to excise an intestinal ulcer. It is true that in the case of young children such an operation would not be free from risk, but with young adults there could be no possible objection to so radically dealing with a condition that in itself may subsequently prove a menace to life.

AUTHORS REFERRED TO.

1. SIMS WOODHEAD.—'Lancet,' 1888, vol. ii, p. 51.
2. WALTER CARR.—'Lancet,' 1894, vol. i, p. 1177.
3 W. S. BRANSON.—'Med.-Chir. Trans.,' 1905.
4. KOCH.—'Trans. of the Brit. Con. on Tuberculosis,' 1902, vol. i, p. 29.
5. NATHAN RAW.—'Brit. Med. Journ.,' 1904, vol. i, p. 1245.
6. WYSS.—'Ann. of the Univ. Med. Sci.,' 1895, vol. i, p. 76.
7. WILLIAM HUNTER.—'Brit. Med. Journ.,' 1904, vol. i, p. 1126.
8. J. IPSEN.—'Brit. Med. Journ.,' Epitome, October 6th, 1906, par. 82; also 'Berl. klin. Woch.,' June 11th, 1906.
.9. JOSEPH COATS.—'Manual of Pathology,' fourth edition, p. 874; also 'Glasgow Medical Journal,' 1886, p. 54.

10. GUTHRIE.—'Lancet,' 1899, vol. i, p. 289.
11. HANSEMANN.—'Berl. klin. Woch.,' 1898, p. 233.
12. McARDLE.—'Royal Acad. of Med. in Ireland,' February 16th, 1906.
13. BRUNNS.—'Beitr. zur klin. Chirurg.,' Bd. ix, p. 206.
14. N. SENN.—'Journ. of the Amer. Med. Assoc.,' 1898, vol. xxx, p. 1315.
15. CROWDER.—'Amer. Journ. of the Med. Sci.,' N.S., 1900, vol. cxix.
16. SUCHIER.—'Berl. klin. Woch.,' 1899, p. 617.
17. F. M. CAIRD.—'Trans. of the Med.-Chir. Soc. Edin.,' 1904, N.S., vol. xxiii, p. 26.
18. HARBITZ.—Review in ' Brit. Med. Journ.,' August 15th, 1905.
19. MARTHA WOLLSTEIN.—'Archives of Pediatrics,' May, 1905.
20. MITCHELL CLARKE.—'Lancet,' 1904, vol. ii, p. 147.
21. SAWYER.—'Medical News,' May 23rd, 1906.
22. BAER AND KENNARD.—'Johns Hopkins Hospital Bull.,' January, 1905.
23. BONOME.—'Gazz. degli Osped.,' July 14th, 1907 ; also ' Brit. Med. Journ.' Epitome, 1907, vol. ii, p. 52.

CHAPTER VI

SEQUELÆ OF TUBERCULAR ULCERATION OF THE INTESTINE

1. MIXED INFECTION
2. HÆMORRHAGE

It is possibly more correct to speak· of the sequelæ than of the complications of tubercular ulceration, for the various conditions now to be described follow, more or less, as the result of ulceration or of its gradual progress. These may be best represented in the form of a "table," which, however, is merely a numerical presentation, and in no way an indication of the order in which they may appear. For the condition of mixed infection, which heads the list, may never occur in a case which may subsequently succumb to a general miliary tuberculosis. The classification is founded on a pathological and not a clinical basis, because clinically two different pathological lesions could give rise to a similar train of symptoms, as, for instance, in the cases of stricture of the bowel and external adhesions causing kinking or constriction of the same; in both instances the symptoms would be those of chronic intestinal obstruction. These sequelæ are considered in relation both to the small and large intestine, and although certain differences arise in connection with the subject of symptoms which will entail a separate consideration of the latter, it will be understood, except where otherwise stated, that the descriptions apply either to the one or the other segment of the canal.

Only one other remark is necessary before proceeding to enumerate the various sequelæ, and that is that not every pathological process mentioned is exclusively the result of tubercular ulceration. Thus tubercular peritonitis, acute suppurative peritonitis, and some others may owe their origin

to other causes only indirectly associated, or not associated at all, with the intestinal ulceration.

In discussing the sequelæ, it is proposed to deal with them in the order in which they appear in the list, taking, therefore, the condition of mixed infection first.

TABLE OF SEQUELÆ OF TUBERCULAR INTESTINAL ULCERATION.

1. Mixed infection.
2. Hæmorrhage.
3. Stricture.
    (a) From cicatrix of healed ulcer.
    (b) From hyperplastic tissue formation of active ulcer.
4. Localised tubercular peritonitis.
    (a) Causation of adhesions.
    (b) Formation of localised effusions.
    (c)   ,,   ,,   ,,   abscess.
    (d)   ,,   ,,   fistulæ either
        (1) Into neighbouring viscus, or
        (2) On to the surface of the body.
5. General tubercular peritonitis.
6. Perforation into general peritoneal cavity.
7. Generalised miliary tuberculosis, or advanced secondary lesions in other organs.
8. Lardaceous disease.
9. Intussusception.
10. Carcinoma.

1. MIXED INFECTION.

Mixed infection of a tubercular ulcer is not an uncommon sequela; and, when it occurs, doubtlessly aggravates and accelerates certain symptoms, as well as accounts for a good deal that might not otherwise have arisen in the unadulterated process of tubercular ulceration. Why a given intestinal ulcer should, in one case, manifest a comparatively rapid and exaggerated necrotic process, while, in another, pursue its own sluggish hyperplastic course, it is not easy to say. But it is possible, however, to venture upon some probable explanation. Two factors are likely to be at work, one, a want of resisting power on the part of the tissues, and the other, the

presence of virulent pathogenic or saprophytic micro-organisms. The intestinal flora is at all times a pretty abundant one, and when the conditions are such that there is an undue growth and propagation of the *Bacillus coli communis*, the *Staphylococcos pyogenes aureus*, and the streptococcus, it becomes possible that the already devitalised tissue, associated with the

FIG. 8.—Tubercular ulceration of the cæcum and ascending colon, showing the mucous membrane almost entirely removed by, probably, a mixed infective process.   (Guy's Hospital.)

tubercular ulcer, forms a suitable seat for these virulent micro-organisms to attack.   It is still further of interest to note that the ulcers most liable to mixed infection are those in the lower part of the ileum and cæcum, just where there is temporary stagnation of the fæcal contents, and where, therefore, the bacilli and micrococci get the best chance to invade.

Museums of pathological specimens contain many striking

illustrations of this condition of mixed infection ; but I will only refer to two or three. In University College Museum there is a specimen (No. 3211) of a large intestine from a girl, aged six and a half years, who died -of intestinal obstruction. There is a piece of bowel about four inches in length, where, with the exception of a few hypertrophied folds of mucous membrane, the surface has been completely destroyed by ulceration. In places the wall is so undermined as to be almost perforated. In Guy's Hospital Museum there are two very good examples. In the one (Fig. 8) the mucous membrane of the caecum and the ascending colon is almost entirely destroyed, the ulcerated surfaces having a rough and pitted appearance. The specimen was taken from a man, aged twenty years, who died of advanced phthisis. In the other (Fig. 9), the caecum and colon are involved for an even greater extent. The specimen was removed from a girl, aged four years. One of the best illustrations, perhaps, of this condition is that afforded by a specimen in the Museum of the London Hospital (No. 1215). It was taken from a woman, aged twenty-five years, who died of advanced phthisis. The specimen exhibits the lower end of the ileum and the caecum and a part of the ascending colon. The preparation is laid open so as to show the extensive ulceration, which is described as dysenteric in type. The ileum is most seriously affected, the mucous membrane being in shreds, and in a great part removed in transverse tracts of ulceration ; the caecum also is extensively ulcerated. Hardly of less illustrative value is a specimen in the Pathological Museum of the University of Edinburgh (No. A1. E. j.3 [849]), where the mucous membrane of the caecum is seen to be in a greatly advanced state of ulceration.

One somewhat striking feature about these infected ulcers is the extreme irregularity which they come to assume. Typical tubercular ulcers may be seen in other parts of the bowel, both small and large, but these rugged excavations, as seen in the caecum, present no features the least in common with the true type. The mucous membrane will be found hanging in shreds into the cavity of the bowel, or as isolated œdematous pendulous masses. In some cases so extensive is the apparent sloughing and destruction of tissue that, as in the case of the specimen in the London Hospital Museum, it is described as dysenteric in type. A further result of this mixed infection is shown in

the tendency which exists for perforation and abscess formation. In not a few of the specimens exhibited it is noted that perforation of the bowel had occurred in one or more places. This particular form of the disease is quite distinct from that other kind which occurs in this same region, and is known as the hyperplastic type.   This will be fully considered when dealing with ileo-cæcal tuberculosis as a separate disease.

Mixed infection of a tubercular ulcer may be considered as probable when there is marked tenderness in the region of the

Fig. 9.—Tubercular ulceration of the cæcum showing the result of mixed infection.   (Guy's Hospital.)

ulcer, and when, from no other explanation, there is a rise of temperature.   Mucus, pus, and sometimes blood will be found in the stools, and more particularly so when the disease involves the cæcum and colon.

2. HÆMORRHAGE.

Hæmorrhage, as a sequela or complication of tubercular ulceration of the bowel, is extremely variable in its appearance,

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and is probably more frequently than not an entirely acci-
dental occurrence. Two conditions predispose to its happening;
the one, the situation of the ulcer in relation to the blood-
vessels ; and the other, the acuteness of the infective process.
In both instances, therefore, the fact of the ulcer being tuber-
cular has little or nothing to do with the bleeding ; for ulcera-
tion due to any cause may open a blood-vessel.   There is,
however, this possible distinction between tubercular ulceration
and other forms of tissue necrosis, that there is a very strong
tendency in all tubercular processes for the formation of a
hyperplastic exudation and fibrous organisation, which tends
both to constrict and occlude the vessels of a part, or, at least,
to check any great patency of a vessel should it be opened.
It is possible that this same pathological process has something
to do with the comparatively rare septic infection of the system
through the exposed ulcerated surfaces on the bowel wall ; for
although we know that a tubercular ulcer may be present in
the bowel for years, it is an extremely uncommon thing to meet
with portal infection and hepatic abscess.

Common enough as is the presence of blood in the motions,
the occurrence of hæmorrhage to an alarming extent is rare.
The following case recorded by C. Atkin (1) is of interest in
this respect.

CASE II. *Intestinal obstruction from tuberculosis ending fatally from
haemorrhage.*

A woman, aged thirty-seven years, was sent to the Sheffield Royal
Infirmary suffering from obstruction of the bowels. After copious
enemata, etc., the bowels were well opened. The symptoms then pointed
to hypostatic pneumonia, though some abdominal tenderness persisted.
The woman was enormously fat, and enteric fever was excluded. After
a fortnight's irregular temperature hæmatemesis occurred, followed by
copious bleeding from the bowel and death.   At the *post-mortem*
three or four large tubercular ulcers were found ; the alimentary canal,
from the duodenum downwards, was full of blood; the peritoneum
was studded with masses of tubercle commencing to become caseous,
and with miliary tubercles. No sign of any ulceration was found in the
stomach; the blood, therefore, had regurgitated through the pylorus.

In a case which came under my own observation the
hæmorrhage which occurred from the bowel misled the family
doctor into the somewhat natural belief, considering the age of

the child, that the case was one of intussusception, and for this it was admitted into the infirmary.

CASE III. *Multiple tubercular ulcers of the small and large intestine: intestinal hæmorrhage: tubercular masses in the cerebellum and pons: general miliary tuberculosis.*

Margaret L—, aged six months, was admitted to the Victoria Infirmary in January, 1903. The mother stated that the child had been ill and out of sorts for about a fortnight, and that a few hours ago it had passed a quantity of blood by the bowel. A doctor who was called in to see the case, considering it one possibly of intussusception, sent it to the hospital.

On admission the child looked collapsed, and for the last twenty-four hours had refused to take the breast. Palpation of the abdomen and digital examination of the rectum revealed nothing abnormal. The child gradually became weaker and died twenty hours after entering the institution. During the short period the child was under observation the bowels moved several times; the motions were of a light yellow colour and gelatinous consistency mixed with some black fragments, but no blood was seen. At the *post-mortem* examination miliary tubercles were found in the liver, lungs, kidneys and spleen. A caseous mass about 1½ by ¾ inches was found in the left side of the cerebellum, and a similar mass existed in the pons. Numerous small tubercular ulcers were present in the bowel, extending from the jejunum down to the rectum.

In itself, bleeding from the bowel as a consequence of tubercular ulceration can only help to confirm what other symptoms more strongly suggest. Indeed taken as a solitary symptom, it may be more likely to mislead than to guide in the absence of any other more marked indications of tubercular disease. The question, therefore, of differential diagnosis is of no little importance in seeking to explain the cause of intestinal hæmorrhage. In adults, and especially in patients over fifty years of age, bleeding, if not from hæmorrhoids, is more likely to be the result of malignant ulceration of the colon; and among other causes which must not be lost sight of at this period of life are portal congestion from hepatic disease, heart troubles, and embolism or thrombosis of the mesenteric vessels. In young adults chronic ulcer of the duodenum or the stomach should be borne in mind; while in children, intussusception is probably the commonest cause. Other diseases productive

of intestinal hæmorrhage are typhoid fever, leucocythæmia, purpura hæmorrhagica, hæmophilia, scurvy, severe intermittent and remittent fevers, and lardaceous disease. Vascular growths in the bowel wall and injuries to the same are conditions more directly concerned with the locality itself. In most of these conditions, owing to other prominent collateral symptoms, no difficulty will be encountered in correctly diagnosing the cause of the bleeding. Its source, whether from high up or low down in the canal, will be mostly determined by the relation borne by the blood to the motions, and by its colour and character. When derived from the small intestine it is often very dark in colour, and more particularly so when coming from the stomach or duodenum, under which circumstances the motions sometimes look like tar, and are not unfrequently extremely offensive. The chief feature to note, however, is the intimate way in which the blood is intermingled or mixed with the other bowel contents. When the blood comes from the lower segments of the canal, and more specially when coming from the colon, it may be found in clots, or streaking the outer surface of well formed motions. While the blood itself may present nothing distinctive in cases of tubercular ulceration, the mucus or pus accompanying it may be found to contain tubercle bacilli. (See page 39.)

Author referred to.

1. C. Atkin.—'Lancet,' 1900, vol. ii, p. 1432.

CHAPTER VII

SEQUELÆ OF TUBERCULAR ULCERATION OF THE INTESTINE (*continued*)

3. STRICTURE

CONSIDERING in the first place the incidence of age, there seems no period of life exempt from stricture the result of tubercular ulceration. The youngest patient among my own cases was three and a half years, while one of the oldest I have found recorded was a man aged sixty-eight years. König (1) considers that multiple tubercular strictures are more frequently met with giving rise to symptoms between the ages of twenty and thirty years, and especially in those suffering from other tubercular lesions. This period will, I think, be found to be the one most in keeping with the experience of other observers. The question of sex seems to have no bearing upon the matter.

As regards the number and situation of strictures of the small intestine considerable variations exist. Numerically they depend upon the number of separate seats of ulceration pre-existing; and from a solitary one they may mount up to any number; the largest number I have met with was eleven. In situation they may be found anywhere throughout the entire length of the jejunum and ileum, but are more frequent towards the lower end of the latter. The highest located one that I have seen was situated about three feet from the commencement of the jejunum.

The particular nature of the stricture affords several points of considerable pathological interest.

It appears possible to divide strictures, the result of tubercular ulceration, into two somewhat distinct classes, although between these two there is every gradation of the one into the other.

Taking the simpler form first, we have a stricture that is

solely the result of a healed lesion ; that is to say, the original ulcer, after having advanced to a certain extent, heals ; and the resulting repair of the destroyed and removed tissue leads to the formation of a stricture exactly in proportion to the size of the ulcer.   We find, therefore in these cases, considerable variation in the extent of the stricture.   If the ulcer before healing had completely encircled the bowel, the resulting stricture would be annular.   If, on the other hand, it had

Fig. 10.—Stricture of the ileum the result of healed tubercular ulcers.
(Guy's Hospital.)

only partially advanced round the circumference, a bridge-like band would result.   A striking feature in all these cases, and especially so when compared with the other form to be presently described, is the lack of any marked thickening about the region of the stricture or cicatrix.   This, for instance, is well shown in Fig. 10.   It was a specimen removed from a woman, aged eighteen years, and represents two strictures in the ileum.   At the *post-mortem* several ulcers were found scattered throughout the ileum, but no tubercular lesion existed

elsewhere.   An illustration of a bridge-shaped stricture which led to obstruction was afforded in one of my own cases (see Case V).   It was seated in the jejunum.

The other form of stricture, that which is more commonly met with and represents also the more striking characteristics of a tubercular process, is of a so-called hyperplastic nature. It would seem as if, in strictures of this class, the active

Fig. 11.—Hyperplastic tubercular stricture of the ileum.   (St. Bartholomew's Hospital.)

process of ulceration remained in abeyance, while a slow progression of inflammatory changes continued, consisting in exudation and organisation.   The result is that the bowel gradually becomes obstructed by the encroachment on its canal of the increased thickness of the parietes.   The condition referred to is represented in a somewhat high degree in Fig. 11. It is a photograph of a specimen in St. Bartholomew's Hospital

Museum (No. 2012c) of the ileum and cæcum, which were so thickened that the condition was the cause of the obstruction. As far as I can remember there is no statement in the catalogue to the effect that the condition was verified as tubercular by microscopical examination,* but it is noted that " annular strictures with ulcers on them exist in the ileum, proximal to the thickened part." To the naked eye the appearances are very much those of colloid carcinoma; but, on the other hand, they precisely resemble similar thickenings, found more particularly in the cæcum, where the conditions have been verified as unmistakably tubercular. The more typical example of this form of hypertrophic or hyperplastic stricture is represented by a uniform, raised, circular projection exhibiting a more or less smooth ulcerated margin with edges that gradually slope towards the normal bowel wall (see Fig. 12). The particular nature of this thickening it appears difficult to explain. It would seem, in one sense, as if the irritative process, involved in the slow and persistent growth of the tubercle bacillus, caused an inhibitory reaction on the part of the tissues which tended to repel and prevent the incursion of the micro-organisms, the changes, therefore, being of a chronic inflammatory type. That the new process may not really be tubercular in character appears to be shown by the fact that neither " giant cells " nor caseation may be discoverable in it. Antonin Poncet and René Leriche (2) explain the condition as a chronic inflammatory process (" para-tuberculous "), probably due to the toxine of the tubercle bacillus, which, being manufactured in the tubercular lesion, is carried by the blood into the deeper tissues, and even to more remote parts.

It seems questionable whether this form of stricture ever disappears. Supposing, however, such a result is possible, it usually kills by its obstructive effects before a long enough period has elapsed for its absorption and final disappearance.

In contrasting the appearances presented externally by these two forms of stricture, the former shows a narrow constriction with little or no other evidences; but the latter, while also narrowed, although usually much less so, involves a longer

* I was subsequently informed by Dr. Andrewes, Curator of the Museum, that the specimen had been microscopically examined by Dr. Kanthack and proved to be tubercular.

portion of the gut, and has both the appearance and tactile sensation of solidity.   The surface of the bowel loses its usually smooth and lustre-like appearance, and presents instead a roughened irregular exterior, often dotted with miliary tubercles.   When, too, the chronic inflammatory process has invaded the peritoneal coat, there is a great tendency for these hyperplastic strictures to become adherent to neighbouring coils of intestine and other parts.

As has already been stated, there are several intermediate forms of stricture between the two kinds just described.   They are well represented by Figs. 13 and 14.   Both the photographs were taken from specimens in St. Thomas's Hospital

Fig. 12.—Hyperplastic tubercular stricture of the intestine seen in section.
(Victoria Infirmary, Glasgow.)

Museum, which were removed from the same patient.   Fig. 13 (No. 1064) represents well the triple process at work.   There is active ulceration in some parts, repair in others, and the thickening due to the hyperplastic or chronic inflammatory process.   The specimens also exhibit, what is so frequently seen where there has been much destruction of mucous membrane, small pedunculated masses of the mucous coat hanging freely into the canal.   The process of healing has left islets of healthy mucous membrane which, as cicatricial contraction takes place, are caused to project into the lumen of the gut. Above and below the main constricting ulcer are seen two others which have been less destructive in their effects, and from the peculiar worm-eaten appearance seem to be healing without the production of any marked constriction.   Fig. 14

shows the external appearance of conditions represented in Fig. 13. The bowel is constricted and has the appearance also of some thickening at the seat of constriction. It combines the result of cicatricial contraction and hyperplastic new formation.

There is a somewhat unusual type of tubercular stricture which I have met with, and which I do not remember having seen described. It is caused by adhesion together of two limbs of the bowel so that a big inverted fold is formed which obstructs the passage of the canal. It might be aptly designated as a "kink" stricture. It occurs in the immediate vicinity of the ulcer and is the direct result of the localised peritonitis set up by it. Fig. 15 will perhaps convey a better idea of what is meant. It represents, diagrammatically, a section of the intestinal canal in its long axis. The canal proximal to the inverted fold is dilated and its walls hypertrophied. Where the ulcer has to a certain extent healed, the fold becomes contracted and constricts still further the calibre of the canal. When not of old standing the separation of the adhesions between the two coils admits of the bowel being straightened out, and its canal more or less reconstructed to the normal. The stricture is in reality of the nature of a sharp kink. Two strictures of the kind here described were encountered in the case fully narrated at the conclusion of this chapter (see Case X).

The result of partial occlusion of the lumen of the bowel, by whatever process produced, leads to other changes similar to what is observed in all other parts of the body where a muscular canal is obstructed. Above the stricture is dilatation and hypertrophy, below it contraction and atrophy (see Fig. 20). There is, however, the utmost variety in the degrees to which these relative changes may reach. How enormously the bowel may dilate above the stricture is well exhibited in one of my own cases (see Case V) ; and illustrations are not wanting to show how the extremely dilated and hypertrophied portion of gut has presented the appearance even of a stomach. Thus, F. M. Caird (3) records two cases. In one, where the stricture was distanced twenty-two inches from the ileo-cæcal valve, the small intestine above measured seven inches in circumference and one sixteenth of an inch in thickness ; while below the atrophy was so marked that the

attenuated translucent bowel was only two and a half inches in circumference.   In the second case, immediately on opening the abdomen " a hugely dilated coil of small intestine, which simulated a distended stomach, was encountered."   An examination of the specimen after removal showed the circumference

Fig. 13.—Tubercular stricture of the small intestine, showing the triple process of active ulceration, cicatrisation, and hyperplastic formation. (St. Thomas's Hospital.)

of the dilated bowel to be nine and a half inches with greatly thickened walls, while that below the stricture was " extraordinarily thinned and atrophied."

While the dilatation is, as a rule, uniform—the appearance of the distended gut being merely that of a great enlargement—it may, from some inexplicable cause, be asymmetrical.   This was exhibited in one of my cases (see Case VII).   Here the

appearance was much like the ileum entering the cæcum (see Fig. 16).   A unilateral bulging of the bowel-wall appears to have taken place, and, either as the result of previous weakening of the bowel-wall, or as a consequence of subsequent thinning, a small perforation occurred which led to the fatal peritonitis. Sutherland (4) exhibited a specimen at the Pathological and Clinical Society of Glasgow, where, immediately above the obstruction, in addition to a general dilatation and hypertrophy of the bowel, there was " a large localised bulging or sacculation."

But ulceration and perforation of a non-tubercular kind is a not infrequent sequel to dilatation, the result of obstruction (see Case VII).   As in other causes of obstruction, it arises from the irritative effects of the dammed-up bowel contents. Further changes are frequently evoked by this obstructive process, for, short of ulceration, inflammation of a catarrhal type may be caused, and the result shown in the stools containing mucus and sometimes blood.

SYMPTOMS.

The early history of cases of tubercular stricture of the small intestine is of an extremely variable character.   Not unfrequently the statement will be made that, up to the onset of the present illness the patient had enjoyed good health. But often when questioned more minutely concerning various ailments that have been suffered from, it will be found that there have pre-existed symptoms suggestive of some bowel irritation—possibly an attack, or attacks, of more or less intractable diarrhœa, which occurred at a comparatively early period of life; in other words, that the patient had, at some time or other, presented symptoms suggestive of tubercular ulceration.   The history of tubercular disease in some member of the family may also be ascertained ; but it is quite a common experience to find that these patients are the offspring of perfectly tuberculous-free progenitors.

The commencement of the illness for which treatment is finally sought presents many marked degrees of variability. The onset in one class may be insidious, in the other comparatively sudden.   In the former various dyspeptic symptoms— spoken of sometimes as bilious attacks—are complained of,

and the misleading impression conveyed that the patient is suffering from some gastric trouble rather than intestinal. The occurrence of pain also at so short an interval as an hour or two after taking food is apt still further to confuse the diagnosis (see Cases V and VIII).   On the other hand, the more prominent symptoms may have been connected with the bowels, and diarrhœa or constipation prove a constant source of annoyance.   Definite disturbances of the gastro-intestinal canal are usually associated with increasing weakness and loss of flesh.

When the initial symptoms are more or less sudden in their onset they are generally dependent upon obstruction.

FIG. 14.—Tubercular stricture of small intestine.   The bowel represents the external appearances of the internal lesions exhibited in Fig. 13. (St. Thomas's Hospital.)

Acute intestinal obstruction, as represented in its severest form, is but rarely met with in cases of tubercular stricture of the small intestine.   The process by which the lumen of the canal is narrowed is so extremely slow that the bowel above the obstruction has time to accommodate itself to the requirements of the altered state; and as the intestinal contents are of a more or less fluid character, they are able to be propelled through a comparatively narrow channel.   The obstructive symptoms from which these patients suffer are not infrequently intermittent. Comparatively long periods may sometimes intervene between two attacks of obstruction.   Local conditions, as well as temporary indiscretions in diet, may account for these variations, and patients are sometimes themselves able to specify certain foods that will exacerbate or excite an attack.

But the intermittency which is occasionally seen in cases where errors of diet can hardly be considered to offer a sufficiently satisfactory explanation, is probably due to some temporary
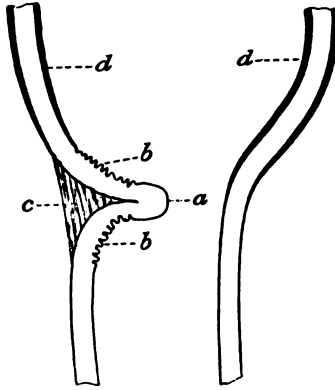
FIG. 15.—" Kink " tubercular stricture of the bowel. *d,d*. Dilated and hypertrophied bowel. *b, b*. Tubercular ulceration. *c*. Adhesions causing the bowel-wall to project as a fold into the canal (*a*).

local inflammatory changes, whereby the calibre of the strictured canal is for the time being lessened.

The appearances which these patients present when suffering
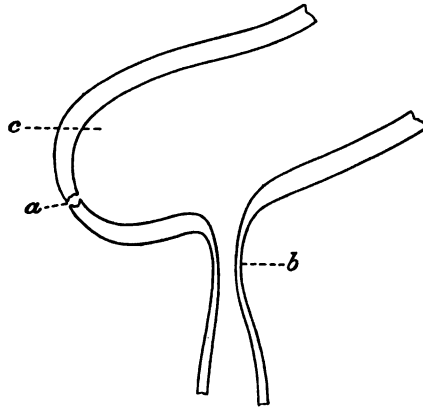
FIG. 16.—Asymmetrical dilatation and hypertrophy (*c*) of the bowel, with perforation (*a*) above a tubercular stricture (*b*).

from well-marked chronic intestinal obstruction again offer features of considerable variation in proportion to the period during which the obstructive symptoms have lasted. This particular phase is well represented in the cases narrated

below, which also serve to bring out many other points of interest connected with the symptoms and treatment of the disease. When the obstructive symptoms have lasted for some time an extreme condition of emaciation is reached. The patient is reduced literally to skin and bone. The skin is
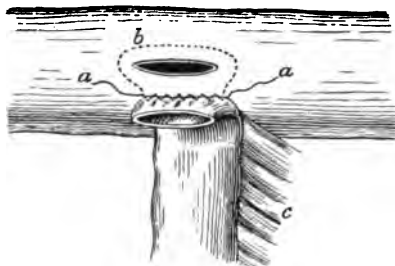
Fig. 17.—Entero-anastomosis by lateral implantation. *a, a.* Ends of outer continuous Lembert suture, which after the passage of the inner continuous Lembert uniting the margins of the intestinal orifices, is continued round the dotted line *b.   c.* The mesentery.

sallow in colour and rough and almost file-like to touch. It stretches over the projecting points of bone like parchment. The nervous system is numbed, and the patient's cerebration one of lethargy and listlessness. The abdomen may be inflated
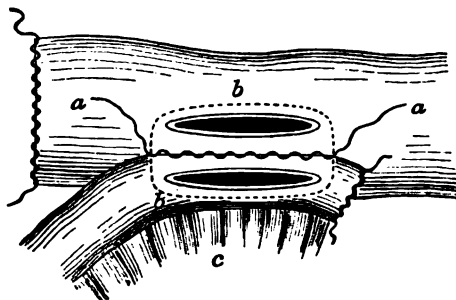
Fig. 18.—Entero-anastomosis by lateral approximation. *a, a.* Ends of outer continuous Lembert suture, which, after the passage of the inner continuous Lembert uniting the margins of the intestinal orifices, is continued round the dotted line *b, b.   c.* The mesentery.

like a drum and tympanitic all over, more or less rigid from hyperdistension, free from tenderness, and usually without any evidence of tumour or fluid within the peritoneal cavity. On the surface of the abdomen may be seen the outlining of the distended coils of small intestine ; and now and again vermicular movements are distinctly visible. Succussion may be

present, and more particularly is this likely to be the case when there is very great distension of the bowel above the obstruction. Flatulence is often very painful and troublesome, and the "rumblings" of borborygmi may be loud enough to be heard at some distance from the patient. Diarrhœa is frequently constant, although intermittent attacks of constipation may take place. The urine is usually scanty and high coloured, and in some old-standing cases albumen may be present. The tongue may be moist or dry, clean or coated; the breath is often foul; the pulse feeble and slow, and the temperature normal. The diet, owing to the anorexia from which these advanced cases usually suffer, is frequently limited to small quantities of liquid nourishment.

Such is a somewhat extreme picture of what an advanced case of tubercular stricture of the small intestine may present.

A quite opposite state may be represented by a patient who appears well nourished and looks fairly healthy. The only symptoms are those arising during the temporary attacks of obstruction. The patient vomits, the abdomen swells, peristalsis is visible, and for a time there is a distaste for food and a general sense of gastro-intestinal disturbance. Pain and flatulence are symptoms usually most noticeable when peristalsis takes place, and the patient is generally conscious of relief when gas escapes *per anum*. The pain varies, but is sometimes acute to the extent of "doubling up" the patient. It is situated most frequently in the epigastric and umbilical regions. Its severity is probably mostly determined by the extent of the obstruction. In the earlier stages it is of a gripy character, comparatively transient, and felt anywhere in the abdomen.

There is more often than not no indication of tuberculosis in other tissues and organs of the body.

How far the symptoms are to be explained or determined by the multiplicity or situation of the strictures it is hardly possible to say. It is, however, reasonable to assume that, as regards situation at least, the higher the obstruction the acuter and more disturbing the effects, and the more likely also are they to be mistaken for gastric rather than intestinal derangements. Such would seem to be the teaching of two of the cases given below.

The following three cases will serve to illustrate many of the symptoms above described :

CASE IV. *Multiple tubercular strictures of the small intestine ; chronic obstruction ; jejuno-colostomy ; death six months later from inanition.*

JESSIE A—, aged eighteen years, was admitted into the Victoria Infirmary on December 20th, 1900. The history given was, that four years ago, at the age of fourteen, she commenced to feel discomfort in the region of the stomach after taking food. This was frequently accompanied with vomiting, large quantities of ingested food being at times ejected. These symptoms continued, off and on, for about two years. Sometimes she would feel fairly well for a week or so, and then there would be a recurrence of her symptoms. Her diet was limited to practically little more than milk. At the end of this period the vomit became more bilious in character, and was rarely free from a greenish stain. About a year ago her bowels commenced to trouble her. For many days she would have several yellow liquid motions, and then would follow a short period of constipation. Blood was apparently at no time passed. Pain, which at first was felt mostly over the epigastrium, later moved to the right side of the abdomen. Latterly she became conscious of a gurgling going on intermittently in the abdomen. It was frequently preceded by considerable pain in the right side of the abdomen, and often led to vomiting. About a fortnight prior to admission, she noticed for the first time moving "lumps" in the abdomen accompanied by a dull heavy pain and slight gurgling. After vomiting, the "lumps" disappeared. The more recent attacks of vomiting appeared to have been accompanied with somewhat severe attacks of pain felt over the abdomen on the right side. Her appetite had been very poor, and she had continued to lose flesh since the commencement of her illness. As regards her previous state of health, she stated this to have been in every way good until her present trouble began. Her family history was good : no traces of tuberculosis in any member of the family.

On admission to the Infirmary she was noticed to be extremely emaciated, with a marked malar flush. Her tongue was clean and moist, pulse 96, regular and of good tension, temperature 97·6° F. The chest organs were apparently normal. The urine had a specific gravity of 1013 and contained a trace of albumen. Inspection, percussion and palpation of the abdomen presented nothing abnormal except the presence of some gurgling on pressure.

During the three weeks or so that she was under observation prior to operation, her symptoms consisted mostly of pain, intermittent in character, on the right side, and occasional attacks of vomiting. The

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vomit consisted chiefly of the food taken. On one occasion she com-
plained of feeling moving "lumps" within her abdomen, but at no
time was peristalsis observed.

Operation.—The abdomen was opened by a median incision, when
it was immediately discovered that the small bowel presented several
constrictions which, on further inspection, were found to extend from
about three feet down the jejunum to the ileo-cæcal valve ; and no
fewer than eleven distinct strictures were found at varying intervals
throughout this long segment.   It appeared impossible to deal
radically with these strictures ; so a *fistula bi-mucosa* was established
between the jejunum at a point just proximal to the first con-
striction, that is, about three feet from the duodenum, and the
middle of the transverse colon.

She recovered from the operation and continued to improve for
some time, taking her food well, but occasionally complaining of
abdominal pain. The stools, however, remained loose, and showed
distinct indications of being lienteric in character. As time went on,
and notwithstanding her excellent appetite, emaciation became more
and more marked, and it seemed clearly evident that she was slowly
dying from a form of starvation. She lived for about six months
after the operation.

CASE V. *Multiple tubercular strictures of the small intestine ; chronic
    obstruction ; advanced emaciation; enterectomy and enteroplasty ;
    death from progressive exhaustion five days later.*

MAGGIE R—, aged twenty-two years, was admitted to the Victoria
Infirmary in January, 1903. The patient's condition was so extreme,
and her cerebration so slow, that it was impossible to obtain any
satisfactory previous history; but it was ascertained that she had
been under treatment for supposed catarrh of the stomach. She was
kept in bed for four months and fed on milk diet. During this
period she seemed to have suffered from continuous diarrhœa. It
was subsequently ascertained that she had been in the Infirmary
seven years previously, and treated in a medical ward for symptoms
that were regarded as suggestive of gastric disease. The history
of her case at that time recorded the fact that she had for several
years been troubled with indigestion, often vomiting after food.
Her health was noted to have been poor, but there was no statement
indicating any irregularity of the bowels. The symptoms mostly
complained of on admission to the Infirmary at that time were " pain
in the stomach and severe rumbling."

On admission to the Infirmary on the second occasion she was

noted as being so thin as to be reduced almost to a skeleton. Her tongue was clean and her teeth good. The lungs appeared normal. The abdomen was observed to be uniformly swollen, the skin on the surface dry and tough. There was marked tympanicity, and apparently no free fluid in the peritoneal cavity. On shaking the patient splashing sounds were audible, and immediately after marked peristaltic movements were observed. Distension of the stomach with gas showed it not to be dilated.

Operation.—The abdomen was opened in the middle line, when a portion of small intestine presented almost like the stomach, so distended was it and its walls so hypertrophied. On following this down a stricture was encountered, which, when excised, presented a calibre about the size of an ordinary lead pencil. By cutting the contracted or distal bowel obliquely an end-to-end union was effected with the wide transverse section of the dilated proximal segment. From the great length of the intestine which existed below the stricture it was concluded that it involved the jejunum. Further, a second stricture was encountered, and in order to save as much time as possible this was treated rapidly by enteroplasy. It was not so tight as the other stricture, but appeared broader. The piece of bowel removed, when subsequently examined, showed the obstruction to have been due to a " bridge " stricture rather than to an annular one. The patient rallied well from the operation, but seemed slowly and painlessly to die from gradually increasing exhaustion. She lived for only five days.

CASE VI. *Tubercular ulceration of the ileum ; chronic intestinal obstruction ; ileo-ileostomy ; cure.*

J. L—, aged thirteen years, was admitted to the Victoria Infirmary in September, 1907. It was stated that her present illness started about a year ago with several attacks of pain in the umbilical and epigastric regions. The duration of the pain varied considerably, but it sometimes lasted for an hour at a time. After each attack of pain she was usually sick, and had a desire to go to stool. She had three to four attacks of pain every week. During all this time she had been gradually losing flesh. She had also been subject to attacks of diarrhœa, but had never noticed whether the motions were particularly offensive. At the beginning of September, 1907, she had a severe attack of pain over the lower part of the abdomen which " doubled her up." During the next fortnight she had four or five similar attacks. As regards her past history she stated that a year ago she fell off a dyke and hurt herself. The family history was

good. On admission to the hospital she was noticed to be pale and poorly nourished. On examination of the abdomen nothing was made out except an area of tenderness to palpation in the right iliac region. As the mischief appeared located in the right iliac fossa the abdomen was opened in this region by the usual " gridiron " incision. On withdrawing the bowel for inspection a suspicious œdematous condition of the wall of the ileum close to the cæcum was observed. The appendix was searched for and found quite free but somewhat kinked by a short mesentery about one inch from its base. Although to outward appearances it seemed quite healthy, it was deemed wiser to remove it. The small intestine was then more carefully examined, when, within the last twelve inches of it, four constricting tubercular ulcers were detected. Above the first the bowel was markedly dilated and hypertrophied. As it seemed probable from this latter condition that no further constrictions existed higher up the gut, an anastomosis was effected by a " lateral approximation " of the dilated part to a free and unaffected portion of the ileum close to the cæcum and distal to the last stricture. The wound was completely closed and the child made an uninterrupted recovery. She gradually put on weight and was entirely freed from her old and frequent abdominal pains. Her motions became normal almost immediately after the operation. She left the hospital about eight weeks after the operation, to all appearance quite well.

It occasionally happens that patients suffering from the usual symptoms of tubercular stricture are suddenly seized with acute abdominal pains, the result of perforation above the seat of obstruction. The subject has already been referred to in discussing the pathology of the disease; but as affecting the nature of the symptoms which may arise, it must be more pointedly alluded to here. As soon as the shock of the acute pain has passed off, the symptoms manifested become those of acute general peritonitis; and in this they rapidly show a marked difference from the symptoms associated with acute intestinal obstruction. The distinction is best exhibited in the tenderness of the abdomen in the case of peritonitis as compared with the absence of this sign in simple obstruction ; further, the temperature and pulse are apt to run higher in the former than the latter, and the whole course of the disease pursue a more rapid course. But there will be many variations in the degree and general acuteness of the symptoms, for much must depend upon the size of the aperture, the virulence of the extravasated

FIG. 19.—Three tubercular strictures of the ileum in a segment of bowel measuring eighteen inches in length. (Victoria Infirmary, Glasgow.)

material, and the freedom with which the escaped contents can pervade the general peritoneal cavity.

It is needless to observe that as little delay as possible should be exercised before operating.   The peculiar nature of the indirect cause of the perforation necessitates the excision of the stricture as well as the seat of lesion.   When these are close together, as in the case narrated below, both can be removed in the same segment of bowel.   Any extravasated material should be carefully and completely swabbed away ; and, if considered necessary, not only should the seat of lesion be drained but also the pelvic cavity.   Flushing the peritoneal cavity should be avoided, in view of the probable existence of adhesive coils of intestines among which foreign material might be driven.   Success in treatment will largely depend, as in all cases of intra-abdominal perforation from whatever cause, upon the shortness of the interval existing between the moment of perforation and the performance of operation.

CASE VII. *Tubercular stricture of the small intestine ; irregular dilatation of the bowel; perforation in dilated portion ; general suppurative peritonitis ; enterectomy ; death.*

Robert S—, aged three and a half years, was admitted to the Victoria Infirmary in July, 1899. The statement from the friends was, that while he had usually been a healthy boy and had taken his food well, he was not unfrequently seized with griping pains in the abdomen.   His present illness commenced about twenty-four hours prior to admission with sudden acute pain in the belly. His symptoms rapidly developed into those significant of acute general peritonitis. The child was acutely ill when brought to the Hospital. Without any delay he was taken to the operating theatre and the abdomen opened. A condition of general suppurative peritonitis was at once revealed. A part of the small intestine was found adherent to the body wall; the mesenteric glands formed a large mass. On further examination of the bowel a portion of the ileum was discovered presenting considerable dilatation above an evident stricture.   At the apex of the pouched dilated portion there was a well-marked perforation (see Fig. 16). The affected parts were excised as rapidly as possible, and anastomosis effected by lateral approximation with a Murphy's button.

When looking up the facts of the case some eight years after, it was found that unfortunately no record had been kept of the *post-mortem,*

and all that was obtainable was the statement sent up to the Ward after the examination and recorded in the ' Ward Journal' that the condition was tubercular.

DIAGNOSIS : DIRECT AND DIFFERENTIAL.

Difficult as is sometimes the differentiation between chronic intestinal obstruction from tubercular stricture of the small intestine and that arising from other causes, there are, nevertheless, certain suggestive and helpful symptoms which serve to guide to a correct diagnosis.   Among these may first be mentioned the question of age.   In by far the larger number of cases patients suffering from the result of a tubercular stricture are under thirty years of age, the commonest period being between twenty and thirty years.   Exceptions there are, but the older the patient the more likely is the cause to be of a malignant nature.   While in the case of children chronic intussusception may closely simulate tubercular stricture.

The chief guiding features are : The possible existence at some earlier period of life of obstinate, more or less constant or intermittent, attacks of diarrhœa; the insidious onset of supposed gastric symptoms, represented by dyspepsia, bilious vomiting, flatulency and occasional attacks of epigastric or umbilical pain ; the intermittency of such attacks, the patients in the intervals often being comparatively well ; the occasional occurrence of diarrhœa or constipation, inexplicable by any known cause ; loss of strength and gradual emaciation extending over a period of two or more years ; a tubercular predisposition as manifested by the existence of other forms of tuberculosis in members of the family, although in quite a large proportion of cases no such heritable taint will be traced; anorexia and a careful selection of food, limited in advanced cases to a fluid or milk diet.   The existence of such a series of facts as those just narrated occurring in a patient under middle age may be taken as somewhat strongly suggesting the tuberculous nature of the complaint.   While phthisis is one of the most fruitful precursors and causes of tubercular ulceration of the bowel, it is somewhat striking how few of these cases of stricture ever manifest any symptoms of active pulmonary disease.

When dealing with the subject of diffuse intra-abdominal adhesions dependent upon abdominal tuberculosis, it will be found that chronic obstruction may equally result from causes entirely external to the bowel; and in some instances the symptoms are so similar that it may be impossible to differentiate between the two causes. There is, however, this source of distinction, that the distension of the abdomen and the presence of peristalsis are rarely so marked in the case of general matting of the intestines as when the gut is simply narrowed by a stricture. In the latter case the bowel is free to distend, and may indeed reach, as already stated, considerable dimensions. Palpation of the abdomen may be entirely negative; and although enlarged mesenteric glands may be present—and the discovery of their presence would assist towards a diagnosis—the distension of the abdomen is often too great, and the resulting rigidity too pronounced, to admit of any deep investigation.

I have known difficulty arise in deciding whether a case was one of pyloric stenosis or of stricture of the bowel. And the diagnosis in the initial stages of the investigation has been not a little hampered by the predominating history of dyspepsia. Peristalsis is visible, but whether it is gastric or intestinal is often not easy to determine. As, however, the case is more minutely gone into, the exclusion of gastric ulcer serves to eliminate the possibility of pyloric stenosis, and distension of the stomach by one or other method of inflation will prove the existence or not of a dilatation sufficient to explain the visible peristalsis. It is doubtful whether much importance can be attached to the direction of the peristaltic waves. In certain cases they may be very typical; as for instance, when there are continuous and regular progressive waves passing from left to right across the epigastric region. There is little doubt then that the stomach is at fault. And equally when the whole surface of the abdomen presents a " ladder-like " appearance and vermicular movements are visible over a large area, there is little doubt of the involvement of the intestine. But these are not the cases that cause difficulty; it is the intermediate series, where, only by careful watching, an occasional wave is seen inconstant both in its situation and in its direction.

The locality of a stricture, or, if there be more than one, of the highest situated stricture, may to some extent be

gauged by the number of distended coils seen mapped out on the abdominal parietes; for the lower down the obstruction in the ileum the greater the length of the bowel capable of distension proximal to it.   When the obstruction is in the ileo-cæcal region the distension is often much more limited to the lower part of the abdomen, and more particularly to the right iliac region.   But the amount of intestinal distension which

FIG. 20.—Dilatation and hypertrophy of the ileum above a healed tubercular ulcer.   (Victoria Infirmary, Glasgow.)

may occur in any case depends primarily upon the narrowness of the strictured canal, and secondarily on the duration of the disease.   The part of the bowel which first undergoes dilatation and hypertrophy is that immediately proximal to the stricture.   As time proceeds these changes gradually extend upwards, so that in the early stages of the disease the distension may be limited to one region of the abdomen, and only at a later period may the whole cavity become involved.   This is

well represented in Case VIII.   The stricture, a very tight one, was situated somewhere about the middle of the ileum; the bowel for about fifteen to twenty inches above the stricture was greatly distended and hypertrophied but gradually tapered off to normal gut.   The patient's complaint was, as regards distension, that her abdomen swelled up in the hypogastric region, but did not involve the whole cavity.   Her condition was not extreme, so probably in time this more advanced state would have been reached had the obstruction not been removed.

Chronic intestinal obstruction arising from tumour either within the bowel or pressing upon it from without may sometimes prove a source of difficulty in arriving at a correct diagnosis; and more particularly is this the case when these conditions arise during a period at which tubercular stricture is most common.   A tumour, however, which causes obstruction by external pressure is generally large enough to be felt by palpation, and, as already indicated, in tubercular stricture little or nothing as a rule is detected in this way.   A polypus or vascular growth gradually blocking the bowel is usually associated with attacks of bleeding, and blood in the motions to any extent is not a common symptom in tubercular stricture.

It is hardly necessary to do more than mention such conditions as sarcoma, malignant adenoma, and carcinoma, any one of which may infiltrate and thicken the walls of the small intestine, from and including the duodenum downwards. But here again the detection of a tumour by palpation will almost certainly in itself be sufficient to exclude stricture.

In all these cases, however, it must not be forgotten that though the stricture may not itself be tangible, associated masses of tubercular mesenteric glands may be present and be felt; and the question of diagnosis will have to be decided on a general survey of the whole history and collateral symptoms presented by the case, more than upon one particular feature present or absent.

It is possible that in some cases of doubt and difficulty assistance may be obtained by the use of tuberculin injections. In one of my cases, that at the end of this chapter (Case X), I was able to confirm what otherwise, however, was pretty clear—the diagnosis of a tubercular lesion.   Various directions are given regarding dosage; but so far as a comparatively

limited experience admits, I am disposed to make use of
·5 gramme doses of "old tuberculin" injected into the deltoid
every alternate day. If after four consecutive injections no
reaction takes place, it is possibly useless to continue the
process further; and unless any other strong evidence exists in
favour of the presence of the disease, it may be fairly reason-
ably considered not to be present. The test in itself is not
infallible as a negative measure; but when a very marked
positive reaction takes place within from eight to eighteen
hours after an injection, as shown by a sudden rise of tempera-
ture, increased pulse-rate, flushing of face, nausea, restless-
ness, etc., the existence of a tubercular lesion may, at least,
be deemed probable.

Quite recently another method has come into vogue of using
tuberculin for diagnostic purposes. Instead of injection, an
application is made to the conjunctiva. The method known
on the continent as the "ophthalmo-reaction" appears to have
been originally suggested by Calmette; and at a meeting of
the Royal Society of Medicine, Austin and Grünbaum (6) gave
their experience of the method. One drop of an aqueous solu-
tion of a precipitate, obtained by adding 95 per cent. alcohol
to tuberculin, is placed in the eye. Conjunctivitis develops
within twenty-four hours. Out of twenty cases believed to be
tuberculous these investigators obtained a positive reaction in
eighteen. They concluded that the tuberculin ophthalmic reac-
tion promised to be a most valuable method of diagnosing obscure
cases of tuberculosis; but that, like all other tests, it was not
infallible. At the same meeting other investigators gave their
experience, mostly favourable to the method. MacLennan (7),
Webster and Kilpatrick (8) also contribute valuable papers
on the subject; and in the 'Lancet' for December 7th, 1907
(p. 1629), a useful *resumé* will be found, giving results both in
this country and abroad of this new means of diagnosis.

PROGNOSIS.

One would almost be tempted to make use of the same
expression that we are familiar with in the case of urethral
stricture, and say that in tubercular stricture of the intestine
"once a stricture always a stricture." Gloomy, however, as is
the pathological forecast, we may extend the simile farther

into the brighter sphere of treatment, and say that as the one can be cured by excision of the obstruction, so the other may be as successfully dealt with.   But are we right in saying that a tubercular stricture never disappears by natural processes of absorption ?   The question is difficult to answer because we have no means of being certain that a patient who does recover has actually done so from the supposed cause.   And yet if we may take the example afforded in hyperplastic tubercular disease of the ileo-cæcal region, there is no doubt, in strictures of this particular kind, that absorption of the chronic inflammatory exudation does take place.   This will be shown by illustrative cases when treating of the disease of that region (see Chapter X).   The difficulty, as has already been pointed out in the case of hyperplastic stricture of the small intestine, is that the changes which result from the obstruction are inimical to life, and that death is usually evoked before the processes of repair have had time to effect a cure.   But while the stricture may itself never undergo repair in time enough to prevent the destruction of the patient, nature may make a way of escape.   And this she does by a process of short-circuiting. Two parts of the bowel become adherent and a fistula bi-mucosa is established, so that the obstruction becomes relieved (see Fig. 21).   This is purely a pathological accident, and can have but slight effect upon the prognosis of a case.

That this natural process of establishing a fistula may, however, have some effect in causing the future disappearance of the stricture receives support from a case reported by Sutherland and Watson Cheyne (5), where the effect of making an anastomosis by operation apparently led to a complete cure.   A female child, aged three years, presented all the symptoms of tubercular peritonitis and of obstruction.   At the operation an extensive condition of tubercular peritonitis was found, the small intestines being congested, distended, and everywhere studded with numerous tubercles.   There was not a great deal of matting, but some bands were found.   The peritoneal cavity contained a small quantity of clear straw-coloured fluid.   The mesenteric glands were enlarged and caseous.   The bowel at the lower end of the ileum was much thickened all round, " evidently in connection with an extensive tubercular ulceration of the intestine, and the lumen was practically obliterated." An anastomosis was made between the portions of the intestine

above and below the mass.   Four months after the operation
she was in good health, running about all day and eating well.
On examination of the abdomen nothing abnormal could be
detected in the form of thickening, distension or fluid.   At the
end of eighteen months she was in excellent health, and had
passed successfully through attacks of pleurisy, measles, and
diphtheria.

On the other hand, in support of the view, which some are
inclined to hold, that a tubercular stricture of the small intes-
tine never undergoes a cure, I may instance a somewhat

Fig. 21.—Adhesion and communication between two folds of small intestine
due to tubercular ulceration.   (St. Mary's Hospital.)

interesting fact which I observed in a case that I had to
operate upon a second time (see Case VIII).   At the first
operation I performed an enteroplasty upon one among several
strictures that I had to deal with.   This particular one was of
the hyperplastic type ; and when, two and a half years later, I
was obliged to operate a second time for a return of symptoms,
I found it necessary to excise this same stricture.   On examina-
tion of the specimen after removal there was no doubt that,
although a previous channel still existed, the amount of hyper-
plastic exudation and organisation had increased, and that
notwithstanding the fact that for eighteen months, at least, the

patient had enjoyed excellent health and the stricture, there-
fore, had had every chance of disappearing.

The foregoing remarks have had reference entirely to the
hyperplastic form of stricture, for it need hardly be said that
the cicatricial stricture which results from a healed ulcer is
quite incurable by nature's unaided efforts.

The prognosis, therefore, of tubercular stricture of the small
intestine is radically bad, and no hope should be entertained
beyond that which operation holds out. And in this connec-
tion it may be briefly noted that, provided emaciation and
inanition have not advanced too far, operation may be enter-
tained without any compunction. But in very advanced cases
the risks are great ; for successful as may be the operation in
dealing with the disease, the patient's reduced condition is such
as to render repair sometimes impossible, for unless we can look
to the vital forces of nature to help us through, our own well-
planned and well-executed measures may be entirely frustrated.

TREATMENT.

The treatment of tubercular stricture of the small intestine
resolves itself into either palliative or radical measures. Until
the period of chronic and continuous obstruction is reached
much relief can be afforded by careful attention to diet.
Patients themselves very soon find that certain foods cause less
pain than others, and it is a somewhat striking fact that it is
not always those foods which might, à priori from their fluid
character, be considered most suitable that prove to be prac-
tically so. Certain soups will sometimes be found to disagree,
while some kinds of solid food can be taken without discomfort.
It is probable that the true determining factor is the influence
of the various digestive secretions which so act upon the
ingesta as to cause them to assume a suitable condition of
consistency for passage through the contracted channel. It is,
therefore, for this reason that patients are themselves often the
best judges of what causes them less pain and of what is least
likely to cause sickness. However, there are certain materials
which can with advantage be prohibited, anything, for in-
stance, which it is known the digestive juices cannot act upon,
and which, therefore, must pass through the alimentary canal
uninfluenced. These substances are the seeds, husks, and

skins of certain fruits. It is quite a common occurrence in operating upon these cases to find collections of grape-seeds just above the stricture; other indigestible substances met with are fig-seeds, grape-skins, and the skins of other fruits in season— plums, gooseberries, apples, etc. While, therefore, the succulent parts of fruits may be taken with advantage, great care should be exercised in excluding the seeds and skins. The effect of swallowing these indigestible products is to render it likely that they will accumulate above the seat of stricture, and if they do not block the passage they will at least excite and aggravate the contractile efforts of the bowel to force them through.

The constipation from which these patients suffer is apt to lead to the administration of aperients. But it need hardly be said that the bowel is in no want of stimulation to contract. Sedatives rather than excitants are required, and the administration of atropin or belladonna will effect much better results than purgatives. To obtain an evacuation, enemata may be given every third or fourth day ; for it must be remembered that the cause of the constipation is the lack of material in the bowel distal to the stricture, which fails, therefore, to be sufficient to excite peristalsis.

Much as palliative measures may relieve symptoms, they must not be allowed to mask the real interests of the case. Once we are satisfied that the patient is suffering from the effects of intestinal obstruction, the less the delay in proceeding to operation the better. It is possible to wait too long, when the patient's powers have become so undermined that the tissues have not left within them sufficient recuperative power to recover from the lesions and shock incumbent upon a severe and possibly prolonged operation.

I do not propose to enter into all the details connected with an abdominal operation; these are best gleaned from text-books upon operative surgery. I shall merely refer to such technical details as bear especially upon the treatment of the affected intestinal lesion.

On opening the abdomen it may be that a distended coil of intestine will present. Should this be the case, then it is at once known that the part is in close proximity to the stricture, and that by tracing the gut in a direction that shows the hypertrophy and dilatation to increase, the seat of obstruction will

be encountered. It may, however, happen that no such distended coil presents, in which case a loop of small intestine should be withdrawn and traced first in one direction, and if this leads up to the duodenum and nothing abnormal is detected, the gut should be carefully followed in the opposite direction, when the involved region will be found. The bowel should be passed gently through the fingers with as little handling as possible, and re-introduced into the abdomen as each segment is examined. When a stricture is discovered further search should be made for others; for the treatment to be adopted depends upon the number and situation of the strictures. Where several strictures are comparatively close together they may be excised by the removal of the portion of the intestine which contains them. Thus in Fig. 19 there are three strictures situated in the ileum and occupying a length of bowel measuring eighteen inches (see Case VIII). If, on the other hand, the strictures are situated at some distance apart from each other, separate excisions may be necessary. There are cases where the strictures are so numerous and so diffusely scattered throughout the length of the small intestine that it becomes impossible to deal radically with them. Such, for instance, was the difficulty encountered in Case IV, where there were eleven separate strictures dispersed over the whole length of the small bowel, the highest being about three feet from the duodenum. It was quite impossible to deal with each of these, and as the upper was a very marked one a jejuno-colostomy was performed. I entertained the feeble hope that, although the fistula was very high up in the canal, sufficient nourishment would pass down through the strictured segments to avoid the patient's death from natural starvation. As, however, will be remembered, this was not so, although the patient was relieved of all her sufferings and lived in comfort for some months (see page 65).

It is an interesting question to consider how much small intestine may be removed without endangering the future life of the patient. The limit has been fixed at six feet, beyond which it would seem that too little absorptive surface is left behind to supply the necessities of the human system. Caird reached and exceeded these limits in a case where he excised eighty inches, the cæcum being included in the parts removed. The man, whose age was sixty-one, lived for a year,

and gradually becoming thinner and thinner died finally from exhaustion.   Possibly more intestine might be excised in the upper than in the lower segment of the canal.   It would seem, however, that when it becomes a question of excising a considerable length of gut, if this cannot be kept well within the six foot limit, it would be wiser to short-circuit above the highest situated stricture, and trust to such feeble chances as the less radical measure affords.

If from any cause, such as extensive adhesions, it is not possible to excise a stricture, short-circuiting may be effected between the two portions of the gut above and below the obstruction.   Again, where the strictures are too numerous and too sparsely scattered to be dealt with by separate excisions owing to the length of time required, some may be treated by enteroplasty.   This practice I carried out in one case, excising two strictures and " dividing " three.   Entero-plasty should, however, never be executed if excision can be performed.   As shown in the case quoted below (Case VIII) a stricture so treated re-formed ; and it seems only too likely that if executed even under the most favourable circumstances, as, for example, when the stricture is the result of an old healed tubercular ulcer, the necessary injury to the part may arouse a few dormant bacilli, and so cause the disease to be re-lighted up.

If, then, excision has been carried out, the next question concerns the best way to re-establish the canal.

There is a choice of three ways in which anastomosis may be effected :   The first and ideal one is " end-to-end union " ; the second " lateral implantation " ; and the third " lateral approximation."   In the first method the divided ends are joined the one to the other, and when the disparity in calibre is not too great this can be easily effected.   If, however, the proximal segment is enormously dilated and the distal greatly contracted, the difficulties connected with accurate adjustment are too great to admit of the plan being executed without dealing in a special way with the distal aperture.   In order, therefore, to obtain a safe and proper union, the lower orifice must be made oblique, so as to present a margin sufficient in length to equal as near as possible the free edge of the segment above.   I have adopted this method of union success-fully, but I think the second method given above, that of

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lateral implantation, is to be preferred in such cases. This mode of anastomosis is carried out by closing completely the orifice of the distal segment and then stitching the wide aperture of the proximal segment into an opening made longitudinally through the parietes of the distal segment in a line opposite the attachment of the mesentery. The aperture should equal in size that of the one to be united to it, and its one end should be distant about half an inch or an inch from the occluded end (see Fig. 17).

The third method of anastomosis is lateral approximation, and is applicable to the same class of cases as lateral implantation. It is a very safe method of procedure, as free peritoneal surfaces are brought together. After excision of the stricture the two apertures are completely occluded. The free limbs of each segment are then applied to each other, usually, although not always, in such a way that the occluded ends point in opposite directions (see Fig. 18). The fistula to be established should be made opposite the mesenteric margin. The mode of procedure is in all points similar to a gastro-jejunostomy executed by suture.

Upon the relative merits of these two methods of anastomosis I do not think there is much to say. I have employed both successfully. Each is applicable in a similar class of cases ; each takes about the same time to execute ; and each seems to be followed by a like good result. From, however, the ease with which the contents of the proximal segment must pass into that of the distal, I am inclined to favour anastomosis by lateral implantation ; and select this method on all occasions when end-to-end union is not advisable.

In the methods of anastomosis above described, stitching of the parts together has been the means employed to effect a union. Some surgeons prefer to use certain mechanical contrivances, and have done so with more or less success. I cannot help feeling, however, that their use in intestinal anastomosis is not without some risk ; and this risk is increased the lower down the canal they are used. In one instance where I employed a Murphy's button for performing ileo-colostomy in malignant stricture of the ascending colon, acute intestinal obstruction set in, due to the blocking of the aperture with fæces. It would seem that fæcal accretion takes place in a metal canal, and so, by gradually narrowing it, soon

reduces it to a calibre that is easily blocked by a particle of solid material. I once used the "button" in the case of a child suffering from acute suppurative peritonitis, due to per-foration above a tubercular stricture, and where, therefore, it was necessary to excise the latter (see Case VII). My reason for so doing was the great need of rapidity in operation. Possibly such conditions do justify the employment of means which, whatever their risk, are more likely to engender success than would follow upon safer methods needing a longer time for execution. There is little doubt that in certain cases the length of an operation is a cogent factor in the matter of treatment; and however great our preference may be for one particular method over another, we should not allow that pre-ference to bias us in the employment of any procedure that a more extensive knowledge of appliances might enable us to better serve the object we have in view of saving our patient's life.

   The after-treatment in some of these cases is often a little troublesome and needs careful attention. It occasionally happens that patients suffer from diarrhœa for a few days after operation, coupled with a rise of temperature, and in two of my cases, with rigors. In some, also, there is a little bilious vomiting and a distaste for food. But with all these symptoms there are rarely any that are at all alarming; for the wound may appear perfectly healthy, the pulse good, though a little weak, the patient free from all abdominal pain, and the general appearance of the patient suggestive of nothing serious. I have been accustomed to associate some of these post-operative symptoms with the sudden release of a quantity of pent up and fermented material, which, owing to the removal of the obstruction, readily finds its way into the healthy gut below, and is there greedily absorbed into the system. Thus the patient is made to feel sick, and the temperature raised by reason of a kind of toxæmia; also the irritation of the bowel, which has so long been out of action, leads to a form of diarrhœa. It is sometimes noticed that the loose motions contain grape-seeds and other indigestible matter, and are extremely offensive, indicating that the evacuations are largely the result of the long dammed back contents of the obstructed gut. These digestive disturbances, therefore, often render it very difficult to get the patient to take proper

nourishment, and necessitate ringing the changes upon various nutritious substances, usually of a fluid character, which the patient not unfrequently, more often than the surgeon, seems to be the best judge of.   As these patients are often so greatly emaciated it is wise to feed as early as possible, and with the operation of lateral implantation there is, I think, little objection to doing so.   It may be taken as a bad sign when the patient after operation, and the relief of all obstructive symptoms, does not soon begin to show some indication of improvement.   It means, as was above pointed out, that inanition has advanced too far, and that the tissues are no longer able to exercise the necessary reparative processes.

It may be noted here that the want of power of repair possibly exists in many, if not in most, of these cases to a certain extent, and serves to explain a trouble that has been not infrequently noticed during the period of convalescence. It has happened in two or three of my own cases (see Case XV) that a few days, or it may be a week or two, after the operation of enterectomy a fæcal fistula forms, evidently associated with some giving of the bowel along the line of suture.   The causes of this accident are no doubt indirectly due, as above indicated, to the generally weak and low vital power of the intestinal parietes ; but the immediate cause is probably the local infection of the line of suture by the extremely septic contents of the bowel above the stricture, not to add to this also, the general feverish condition, which, as above shown, seems to be the result of the sudden discharge of a quantity of fermenting material into the healthy gut below the seat of the stricture.   Fortunately these fistulæ form very slowly, and for this reason adhesions are contracted which prevent extravasation into the general peritoneal cavity.   They usually seem to make their way through the external abdominal wound.   If the fistula is free from any tubercular infection it will probably rapidly heal.   In one of my own cases the discharge, for a time, was so free through the abdominal wound that almost all the fæces escaped by it.   However, in process of time, it completely closed, and the patient, some years after, was in good health, and free from any bowel trouble (see Case XV).

As regards the treatment of these cases of post-operative fistulæ, little should be attempted, at least for some consider-

able time, beyond the protection of the skin from the irritative effects of the excreta. As the patient's general health improves, so these wounds will be noticed to improve also. It may take months before complete closure is effected, but so long as improvement, however slow, is noticed, such ultimate closure may be expected. When there is reason to assume that the fistulæ have become tubercular in character something operative will have to be attempted. The treatment then required will be the same as that discussed under the more technical heading of fistula, as a sequel to tubercular ulceration of the bowel (see Chapter VIII).

The following two cases are given in illustration of the methods of operating by end-to-end union, lateral implantation, and enteroplasty. But they serve to present also very typical pictures of tubercular stricture of the small intestine both pathologically and clinically.

CASE VIII. *Multiple tubercular strictures of the small intestine, with ileo-cæcal tuberculosis ; chronic intestinal obstruction ; enterectomy and enteroplasty ; recovery.*

Mary C—, aged twenty-six years, was admitted to the Victoria Infirmary in April, 1904. Up to about three years prior to her admission she stated that she had enjoyed very good health, with the exception of occasional bilious attacks. As far as she could remember she had never been troubled with her bowels. Her earliest symptoms commenced with attacks of cramp-like pains across the abdomen. Constipation also began to be a troublesome symptom. She noticed that her pains were always increased when she suffered from flatulency, and sometimes on these occasions they would be severe enough "to double her up." These two conditions of flatulency and constipation gradually increased in severity, and latterly would not infrequently be associated with bilious vomiting. All these symptoms showed a very marked degree of intermittency, for there would occur periods in which she seemed free from all discomforts. She was conscious of having lost flesh considerably during the last few months.

On admission to the Infirmary she was noted to be of a pale, rather sallow complexion, and somewhat emaciated. Her tongue was moist and clean, the teeth bad, those in the lower jaw being merely stumps. Her appetite appeared good. The organs of the chest were normal. An examination of the abdomen revealed nothing abnormal, except that there seemed some gaseous distension at the lower part. During

the few days she was under observation her bowels were loose, moving three or four times in the day, but the motions presented nothing abnormal. No marked abdominal symptoms manifested themselves. Operation was decided upon on account of the typical character of the obstructive symptoms as revealed by the history given by the patient; although, as stated, nothing markedly suggestive occurred during the few days she was in the Infirmary under observation.

On opening the abdomen a distended coil of small intestine at once presented, and on tracing this down it led to some strictures. Three or four were located comparatively close together at the lower part of the ileum. A portion of the intestine eighteen inches in length and containing these strictures was excised (see Fig. 19). Anastomosis was effected by end-to-end union. About five or six inches lower down and about three inches from the ileo-cæcal valve another stricture was encountered. This was treated by enteroplasty. The 'Report' states that this structure was "thickened." The patient recovered well from the operation and left the Infirmary a month later for the convalescent home.

She remained in good health for eighteen months, when she again began to suffer pain in the lower part of the abdomen, similar in character to that which she had experienced in her previous illness. She described her pain on the present occasion as being of a dull, aching character, lasting sometimes for eight or nine hours, and relieved usually by the passage of flatus, which she was conscious seemed to accumulate before finally passing. She had vomited two or three times, and was obliged to take medicine to obtain movement of the bowels. She had on one occasion noticed dark blood in the motions.

She was re-admitted to the Infirmary in October, 1906, that is to say, about two and a half years after her first operation. She stated that she had lost flesh in recent months, but her general condition appeared fairly good. On examination of the abdomen nothing was observed at the time, but she definitely stated that when the attacks of pain came on she " swelled up." There was increased resistance to palpation in the right iliac fossa, and some tenderness, but no tumour could be detected.

On opening the abdomen the omentum was found spread out over the intestines and adherent by fine adhesions to the parietal peritoneum. These were separated and the membrane turned up in order to expose the bowel beneath. It was then found that a thickened mass occupied the right iliac region consisting of the cæcum, appendix, and the distal six inches of the ileum, inextricably

matted together.   This mass was removed, the end of the colon closed, and the end of the ileum planted into the wall of the former just above its occluded orifice.

On examination of the specimen after removal a large ulcer was found encircling the ileum.   It measured about two inches in length and was situated a few inches from the ileo-cæcal valve. The walls of the ulcer were greatly thickened, and from the dilated and hypertrophied condition of the bowel proximal to it had evidently been the cause of obstruction.   On examination of the ileo-cæcal valve it was found to be enormously thickened and ulcerated, and so contracted was the aperture that the little finger could only be thrust through it by force.   On opening the cæcum two ulcers were seen, a small one near the orifice of the appendix, and a larger one at the commencement of the ascending colon.   Both presented typical tubercular features.   The patient made a somewhat tardy recovery, but at the end of five weeks left the Infirmary quite well.

CASE IX.   *Double tubercular strictures of the ileum; chronic intestinal obstruction: ile-ectomy, anastomosis by lateral implantation; recovery.*

Mrs. S—, aged twenty-six years, was admitted to the Victoria Infirmary in January, 1907.   She stated that as a girl she was troubled with attacks of diarrhœa; and from the age of fourteen her symptoms were so associated with her stomach that they were regarded as due to derangement of that organ.   She frequently suffered from indigestion and cramp-like pains in her abdomen.   For several years she had never been free from these attacks of pain.   They came on about an hour and a half after food, and would sometimes last for hours. Although her appetite had been good she always knew that food would cause her pain.   Milk she could always take, and without subsequent discomfort.   She would occasionally vomit, and the material ejected would be little more than the food just taken.   She noticed that she had been gradually losing flesh; and that while weighing at one time 9 st. 8 lb., she only weighed 6 st. 8 lb. on her admission to the Infirmary.

She had always been constipated, but constipation had intermitted with attacks of diarrhœa.   She had frequently noticed that an evacuation would be followed by relief from her pains.   Her family history gave no indications of tubercular disease.

When she entered the Infirmary she was noticed to be extremely

emaciated, her skin pale, but her face somewhat flushed and her eyes bright. Her lungs presented nothing abnormal, and her sole complaint was the pain which she suffered after food. She was induced to seek admission on account of the undue severity of the attack she had about three months ago. This pain she described as cramplike, sometimes cutting in character, and felt below the umbilicus. Sometimes during an attack of pain she would notice a lump rising up and moving across the abdomen, accompanied by gurgling sensations. Her motions had been loose, containing mucus but no blood. She had occasionally vomited yellowish fluid. An examination of the abdomen after admission to the Infirmary revealed nothing, except that there was some little tenderness to palpation just below the umbilicus in the same situation that she felt most of her pain. During the six days she was in the Infirmary prior to the operation her temperature rose to 100° F. in the evening but her pulse kept normal.

On opening the abdomen nothing abnormal was at first noticed. A loop of small intestine was withdrawn and traced in one direction; it was found to lead to the duodenum and presented nothing abnormal. But tracing the bowel in the opposite direction a part was reached where it was noticed that it began to dilate. This dilatation gradually increased, and became associated with hypertrophy until some two feet lower down a tight stricture was encountered with a less contracted one a few inches above it. The bowel beyond was very markedly contracted. As there seemed no evidences of any further strictures, about eight inches of the involved portion was excised, and union effected by lateral implantation.

An examination of the parts removed showed the stricture to be of the healed variety, and so narrow in calibre that force was required even to make water pass through it. Quite an accumulation of grape-seeds existed in the dilated part of the bowel just above the stricture. The appearance of the parts is well represented in Fig. 20, which is a photograph of the specimen.

On the second day after the operation, her temperature rose, and she had a rigor ; she also vomited several times. On the third day there was a second rigor, and the temperature again went up to 103° F. There was, however, no sickness and no abdominal pain. She looked quite well. The following day the bowels moved for the first time. There were several loose, yellowish, very offensive stools containing grape-seeds which had been taken before the operation. During the succeeding day the bowels continued to move, the motions gradually became less offensive, and finally assumed a natural condition.   Con-

comitant with this improvement in the evacuations the temperature came down, and the patient left the Infirmary five weeks after her operation, taking her food well.

This case brings out, what I have sometimes noticed in similar instances, that after re-establishing the continuity of the canal, where there has previously existed obstruction, the passage of the retained septic contents into the healthy bowel below causes a certain amount of temporary toxæmia.

The following case is one of peculiar interest, and is introduced here because of the predominating symptoms of stricture. On the other hand, there were other complications which rendered it equally illustrative of the sequelæ to be presently discussed. The case was sent to me by Dr. Harrison of Lesmahagow, who rightly regarded it as one of intestinal tuberculosis causing intermittent symptoms of obstruction. As a whole the case may be regarded as one of the most severe types of intestinal disease, and probably incurable by any measures, operative or otherwise. But I will narrate the case in full before offering any comments upon it.

CASE X. *Tubercular ulceration and strictures of ileum and cæcum; chronic intestinal obstruction; persistent diarrhœa; laparotomy; extensive adhesions; localised collections of fœtid pus; enterectomy and colo-colostomy; lardaceous disease; death from progressive inanition.*

M. H—, aged twenty-seven years, was admitted to the Victoria Infirmary in November, 1907. Her symptoms commenced about five years previously when she suffered from occasional attacks of pain across the upper part of the abdomen. These attacks, infrequent at first, soon came to be more troublesome, until they occurred about once in every three weeks; and while they did not make her vomit, she found that by forcing herself to empty the contents of her stomach it gave her relief. At an early stage of her illness her bowels did not appear to trouble her, except that during the attacks of pain they became loose. As time wore on these various symptoms became more pronounced. The attacks of pain became more frequent and more severe. Diarrhœa became a constant symptom, there being from three to four very offensive evacuations each day. Now and again an unusually severe seizure of abdominal pain would occur, causing her to " double up," and accompanied with vomiting. At

these times she would also notice that her abdomen would swell up. While her appetite had remained fairly good throughout, her strength and body-weight had gradually diminished, until more recently she had been compelled to keep to her bed. For a year she had suffered from amenorrhœa.

On admission she was noticed to be pale and emaciated, tongue furred, temperature 99° F., and pulse 120. Palpation of the abdomen revealed a tender resistent swelling in the left iliac region. The same swelling was made out both when examining by the rectum and by the vagina, and appeared particularly painful when pressure was exercised upon it in an upward direction through the wall of either canal. The lungs and heart appeared normal. The urine was acid, with a specific gravity of 1032. No albumen or sugar was present. Her family history was good, there being no traces of tuberculosis. During the twelve days she was under observation before operation the motions, which were loose, frequently contained clots of blood. With milk and fluid diet her abdominal pain rarely occurred ; but notwithstanding a considerable quantity of nourishment, emaciation appeared to advance rapidly ; in one week she lost four pounds. While her temperature did not exceed 99·6° F., her pulse was continually high, never below 112, and often reaching 140. For diagnostic purposes ·2 mg. of " old tuberculin " (O.T.) was injected. After a second injection a reaction was observed, the temperature rising to 101° F., and the pulse to 140. For a few days after this the temperature remained higher.

With the assistance of my colleague, Dr. Macrae, the abdomen was opened by a curved incision about five inches in length below the umbilicus. A matted mass was discovered adherent to the parietes in front but covered completely by the omentum. This latter was first separated, and in doing so some extremely fœtid pus, like that of an ordinary appendicular abscess, welled up. It was carefully swabbed out. In further attempting to separate the parts the mass was discovered to consist of small and large intestines intimately united together, and bound down to the bottom of the pelvis on the left side. Considerable force had to be exercised to detach the mass, and in doing so another collection of fœtid pus was opened into. This cavity was similarly swabbed dry. When the mass was sufficiently freed it was found possible to separate the small intestines from the large; but in doing this the former was torn through at one place, and liquid fæces escaped. It was impossible to distinctly define the large bowel, it being so greatly obscured by the thickened and inflamed tissues which surrounded it. From its position, however, it was probably the sigmoid flexure. Fearing that this thickened

mass might possibly have some obstructing effect upon the intestinal canal, and that it was impossible to remove it, colo-colostomy was performed between free portions of the intestine above and below. The piece of the small intestine which had been liberated and torn in the process of freeing, measuring about twelve inches in length, was excised and end-to-end union effected.   During the operation no tubercles were seen anywhere; and although no very careful examination was made, it appeared as if the reproductive organs were unaffected.   The pelvic cavity was swabbed out with saline solution, drained, and packed with iodoform gauze.   The operation lasted about an hour and ten minutes, and at one period the patient suffered deeply from shock.   The shock after the operation also was considerable, and saline injections had to be administered.   In the course of a few hours the patient rallied, and for the first two days seemed to progress favourably.   She had no pain, took nourishment well, her temperature was normal, but her pulse kept at the high rate noted before the operation; she passed flatus, and all signs of obstruction appeared to be removed.   However, notwithstanding the absence of any marked local adverse symptoms emaciation appeared to be advancing apace, and on the fifth day after the operation she died.

On examination of the portion of small intestine removed, a narrow stricture, admitting about a No. 20 perineal tube, was found at that point where the bowel was torn through in detaching it from the floor of the pelvis.   Immediately above and below the stricture the mucous membrane was apparently removed by ulceration, but there was no thickening at the seat of the stricture.   The bowel above was both dilated and hypertrophied, the dilatation being somewhat pouched on one side of the stricture.

Dr. John Anderson made a *post-mortem*, and the following is an abstract of his report: The upper part of the small intestine was healthy, but towards the lower part of the jejunum and throughout the entire ileum a marked ulceration of the mucous coat was met with. At first an infiltrated, swollen and congested appearance of the lymphoid follicles and ridges of valvulæ conniventes, later swollen infiltrated Peyer's patches, and in the lower part of the ileum, extensive alteration of the mucosa of the nature of tubercular infiltration and ulceration was met with.   A number of broad ulcers were present which extended around the entire circumference of the bowel, and in separating an adhesion of the peritoneum one of them was torn into. Areas of mucosa about two and three inches in extent, in the direction of the gut, were present, which showed a combination of the processes of infiltration and ulceration, and which extended across the entire

breadth of the mucous coat.   Areas of thickened and puckered
mucosa, resulting from healed ulceration, were also present.   At two
or three places in the ileum, large folds were seen projecting into the
lumen, giving rise to a pouched character of the wall above and below,
some resembling in appearance, but more deeply developed than, the
normal folds of the large intestine.   Examination of the serous coat
at those places showed the presence of old fibrous adhesions stretching
between adjacent parts of the bowel, the intervening part being tucked
in with the serous surfaces adherent (see Fig. 15).   A large ulcerated
area was present at the ileo-cæcal valve with puckering and narrowing
of this region, but not sufficient to produce obstruction.   The entire
cæcum and part of ascending colon showed evidence of old and recent
tubercular ulceration, while beyond this the mucous coat of the large
intestine was proliferated, swollen and congested, and the muscular
wall somewhat thickened.

Amyloid degeneration was found in the liver, spleen, and kidneys.
Although the uterus and adnexa were buried in adhesions, they other-
wise appeared healthy.   The brain, lungs, and heart were free from
any evidences of tubercle.

Microscopical examination confirmed the tubercular nature of the
lesion.

Of the many points of interest connected with this case that
of the possible origin of the disease may be first considered.
The woman lived in the country, no other members of the family
presented tubercular lesions, and the lesions in the patient
were limited to a very extensive involvement of the intestinal
canal.   Thus, it would seem perfectly reasonable to assume
that the case was one of primary disease of the bowel.   The
second point concerns the history of the disease.   It started at
least five years previously, and had been continuous in its
activity.   Thus, healing had been contemporaneous with
advancing disease ; and the result had shown itself in the
formation of well-defined strictures of two types, coupled with
active and progressive ulceration in other parts of the bowel.
Among the sequelæ were septic abcesses, apparently the result,
in one place at least, of perforation, and the localising
effects of adhesions.   Lastly, the persistent and prolonged
diarrhœa led to amyloid degeneration of some of the abdominal
viscera.

With such extensive infection, both specific and mixed, it
was somewhat surprising that there was no metastatic or

generalised diffusion, that is to say, that no tubercles existed in other parts of the body as secondary involvements; nor was acute and offensive pus discoverable elsewhere than in the pelvic region, where it was well limited by adhesions.

AUTHORS REFERRED TO.

1. KÖNIG.—'Annual of the Univ. Med. Sci.,' 1893, vol. i, p. 39.
2. ANTONIN PONCET AND RENÉ LERICHE.—' Bull. d'Acad. de Méd.,' Nos. 11 and 15, 1906; also ' Lyon Méd.,' No. 30, 1906.
3. F. M. CAIRD.—' Trans. of the Med. Chir. Soc. Edin.,' 1904, N.S., vol. xxiii, p. 27.
4. L. R. SUTHERLAND.—' Trans. of the Glasgow Path. and Clin. Soc.,' 1897, vol. vi, p. 180.
5. G. A. SUTHERLAND AND W. WATSON CHEYNE.—' Lancet,' 1902, vol. i, p. 158.
6. L. J. AUSTIN AND GRÜNBAUM.—' Brit. Med. Journ.,' 1907, vol. ii, p. 1520.
7. WILLIAM MACLENNAN.—Ibid., p. 1642.
8. J. S. WEBSTER AND J. A. KILPATRICK.—Ibid., p. 1644.

CHAPTER VIII

SEQUELÆ OF TUBERCULAR ULCERATION OF THE INTESTINE (continued)

4. LOCALISED TUBERCULAR PERITONITIS

(a) *Causation of Adhesions.*
(b) *Formation of Localised Effusions*
(c) *Formation of Localised Abscess*
(d) *Formation of Localised Fistulæ either—*
  (1) *Into Neighbouring Viscus, or*
  (2) *On to the Surface of the Body*

As long as the ulcerative process remains limited to the mucous and submucous layers of the intestinal wall, and is uncomplicated by mixed infection, few changes are likely to be encountered beyond the seat of lesion, and the result of the tubercular process will be a stricture of one of the types just described in the preceding chapter. Should, however, the external or serous coat be invaded or involved in the chronic inflammatory process, other pathological sequelæ are evoked; and in so far as these are of a purely local character it is proposed to deal with them in the present chapter.

The primary effect of implication of the peritoneum forming the outer covering of the ulcerated region is to cause it to adhere to some neighbouring structure. Why this adhesion should take place at any one particular part more than another it is not possible to say; but one may venture to surmise that, from some cause, a period of quiescence takes place sufficiently long to admit of a glueing of two contiguous surfaces together. Thus, therefore, it may be a matter of pure accident whether the contact and adhesions take place between the affected area and another loop of intestine or between this and some part of the abdominal parietes. The result in each case is the same—the formation of a more or less firm and, perchance, lasting union between these two artificially cemented parts.

Assuming that no further advance takes place on the part of the ulcerative process, we may assume that the result has been, from one point of view, curative; that Nature, by covering a weak spot, has helped to prevent for the time being the occurrence of perforation into the general peritoneal cavity. Unfortunately, however, this happy, more or less immediate, result does not always represent the final phase of the case. For the adhesions which unite the ulcerated area to some other parts may in the future be the cause of obstructive influences, either by kinking or by constricting one or other part of the adherent gut. Or, again, the adhesions may be drawn out into cords, and be the means of forming some of those solitary bands with which we are familiar in certain cases of acute intestinal obstruction.

If, however, the ulcerative process continues, other pathological changes ensue over and above those which result in the simple formation of adhesions. Among the simplest of these is a localised collection of clear serous fluid. This condition is more frequently met with in cases of adhesion of two or more loops of intestine to the affected area than where there is simple union of one part to another, and where, therefore, spaces are left which admit of the accumulation of peritoneal fluid between the adherent coils. This particular sequela, however, is more often encountered in cases of general tubercular peritonitis than in the localised form of the disease at present under discussion (see Case XXXIX). It is but one step further in the pathological process to conceive of these collections of fluid being purulent rather than simply serous. We know that nothing further is required to enable micro-organisms to traverse the visceral parietes of the intestine than the destruction of the protective serous coat, so that as soon as this tunic becomes inflamed pyogenic cocci will pass through and excite their characteristic changes. The formation of an abscess in connection with tubercular ulceration of the intestine is possibly among the commonest sequelæ of the process, and is the explanation in certain cases of rises of temperature and other feverish symptoms otherwise inexplicable. These abscesses may be considered in exactly the same light as we are accustomed to regard a localised collection of pus in other parts of the body. Their chief peculiarity and interest rest in the particular situation in which they are placed, and on this

account, also, the special nature of the complications they may give rise to.   The ultimate course which a localised abscess in connection with a tubercular intestinal ulcer will pursue, will probably primarily depend upon the particular nature and virulence of the organisms which it contains and which gave rise to it.   Thus it is probable that many of these localised abscesses are subsequently absorbed, and either leave no trace of their previous existence or are represented by a calcareous nodule.   It is by no means infrequent to find small isolated concretions in the peritoneal cavity.   But there is only too frequent evidence to show that many of these abscesses do not remain quiescent or disappear, but make their way by direct or devious routes to other parts ; in other words, they may burst into the general peritoneal cavity, lighting up a general tubercular peritonitis or a general suppurative peritonitis, into a neighbouring viscus, on to the surface of the body, or they may empty themselves into that particular part of the bowel from which they practically arose.

Whether a ruptured abscess, associated with a tubercular intestinal ulcer, will cause a general tubercular peritonitis or a general suppurative peritonitis will depend upon the infective character of the extravasated pus.   It is not proposed, however, to trace this aspect of the question further.   Fortunately, it is probably the least frequent of all the processes, for the tendency is for adhesions to advance as the abscess slowly increases in size, so that it remains shut off from the general peritoneal cavity.   Possibly the commonest mode of escape of the pus is either into the bowel, from which it took its origin, or into a neighbouring hollow viscus.   The bladder may be perforated and pus be mixed with the urine, or an adherent coil of intestine may be opened into and a bi-mucous fistula established.   Fistulæ thus formed between coils of small intestine need give rise to little or no disturbance, but if a communication should be effected between the jejunum high up and some part of the colon so that the contents of the former could pass freely into the latter, some looseness of the bowels might result, and the motions would be observed to contain particles of imperfectly-digested food.   Occasionally the abscess may burst into the rectum, in which case it is probable that the ulcer is situated in the ileum.   The following case is a good illustration of one of the above conditions :

CASE XI.   *Tubercular ulceration of the intestine with formation of abscess, which burst into the colon or rectum.*

Alexander S—, aged twelve years, was admitted into the Victoria Infirmary in August, 1899.   The history given was that up to three years ago he had enjoyed good health, but at this time it was noticed that his appetite began to fail and he was inclined to sit near the fire instead of going out to play.   His bowels also began to trouble him and would move from three to five times a day.   The motions were yellow and offensive and occasionally tinged with blood.   He began to lose flesh, and frequently complained of pain in his belly in the right iliac region.   These symptoms continued up to the time of entrance into the infirmary.

On admission it was noted that he was very pale and thin ; pupils dilated ; tongue furred ; and the abdomen distended.   There was a certain amount of dulness to percussion all over the abdomen and more particularly towards the hypogastrium and right iliac region.   In these parts there was tenderness on pressure and a sense of considerable resistance.   There was no evidence of free fluid in the peritoneal cavity, and no enlarged glands could be felt.   The motions were loose.   The temperature was variable, frequently reaching 100° F. in the evening, and sometimes rising to 101° and 102° F.; the morning temperatures were, as a rule, normal.   The urine was normal, and no disease could be detected in the other organs of the body.   He weighed 3 st. 6 lb.   For the first six weeks of his residence in the Infirmary he was under observation in a medical ward.   During this time his symptoms underwent very little change except that the local evidences of pus became more marked in the lower right abdominal region.   For this condition he was transferred to a surgical ward.   He was taken to the operating theatre with the object of opening the supposed abscess ; but immediately before operating a discharge of purulent material took place from the rectum, evidently due to the bursting of the abscess into the bowel.   Pus continued to come for some time, and to facilitate drainage an opening was subsequently made into the abscess cavity through the abdominal parietes.   After this he steadily improved, and left the Infirmary with a small discharging sinus, but with his general health very good.

Irrespective, however, of the formation of an abscess, a tubercular ulcer of the intestine may effect a direct communication with the surrounding parts.   This connection may take

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place with a neighbouring viscus, with the general peritoneal cavity, or with the outside of the body.

These tubercular perforating ulcers present certain features of pathological interest. It is not the nature of uncomplicated tubercular ulceration simply to destroy, but, as has already been fully pointed out, to construct; so that when a tubercular ulcer causes penetration of the bowel-wall it must do so by the active aid of other influences than those connected solely with the tubercle bacillus. The question has already been discussed under the heading of "Mixed Infection" (see page 46); but it is again referred to here as the cause of certain conditions, each in themselves requiring separate treatment.

When a fistula is established between two hollow viscera, the symptoms produced depend upon the nature of the material which finds its entrance from one viscus into the other. Among some of the fistulous communications which may be established are the following: Between one coil of small intestine and another (see Fig. 21); between the small intestine and some part of the large bowel; between the large or small intestine and the stomach; between the small intestine and the urinary bladder; and lastly, between the bowel and the exterior of the body.

The symptoms connected with a fistulous communication between the intestine and either the stomach or bladder will not be difficult to diagnose; for in the one case the patient will vomit material suggestive of the contents of the small or large intestine; while in the other considerable irritation of the bladder will ensue, with possibly painful micturition and the presence of fæcal matter in the urine. In lesions of this nature, while it is possible that in time the fistula might close, the disturbances set up are usually sufficiently grave to necessitate operation. The abdomen must be opened, the united parts separated, and the fistulous apertures excised, or dealt with in such a way as to ensure a lasting and proper occlusion of the communication.

When a fistula exists between two contiguous coils of intestine, symptoms suggesting the nature and situation of the lesion may or may not be present. Thus, the connection between two loops of the small intestine may give rise to no disturbance, even supposing the communication be quite large.

On the other hand, if a free entrance of the contents of the upper part of the jejunum into the colon takes place, then the stools may be found to contain quantities of undigested food. In proportion to the leakage in this connection, so will the patient show more or less signs of emaciation from lack of proper and sufficient nutrition. Where, therefore, there is reason to believe that a patient is suffering from such a cause of natural starvation, operation can alone afford the necessary relief; and, as in the case of the stomach and the bladder, the abdomen must be opened, the parts liberated, and the apertures closed.

The formation of external fistulæ, as the result of progressive tubercular ulceration, is more frequently met with in children than in adults. This may be due simply to the fact that children are more prone to tubercular ulceration of the intestine. As regards the seat of the fistula, however, it would seem that, except in the case of the umbilicus and its immediate neighbourhood, abdominal fistulæ elsewhere are commonest in the adult. The formation of most fistulæ appear to be preceded by the formation of an abscess which points through the skin. This bursts and is sooner or later followed by an escape of fæces or a fæcal-smelling discharge.

The pathology of these fistulæ is comparatively clear in the case of those which form in the right iliac fossa. Here there is a more or less fixed portion of the canal, the ileo-cæcal segment, a part also which is among the most frequent to be infected with tubercular ulceration of a mixed character. The abscess, which sooner or later forms in connection with the progressive ulceration, may pursue a course downwards into the pelvis, backwards to the loin, or forwards to the inguinal and iliac region. Before, however, it has the chance of extending any distance, it is usually opened in the iliac region, and following upon this incision the fistula becomes established (see Fig. 22).

The formation of fistulæ at the umbilicus and in its vicinity in the median line is a much more difficult matter to explain. It is certain from clinical experience that a tubercular fistula in connection with an ulcer of the intestine is extremely rare at any other place on the anterior abdomen. There must, therefore, be some reason for this particular seat of election. As children are almost exclusively the sufferers from this kind

of fistula, one must look for an explanation in the possible anatomical structure and function of the parts in and about the region.

The frequency of umbilical hernia in young children sufficiently indicates that the navel is a weak spot in the abdominal parietes. The anatomical reason of this weakness is to be found in the facts connected with development, where the last part of the abdomen to close is at the point of entrance of the umbilical vessels. The special anatomy of this region has been well worked out and considered by W. Herzog (1), who, in summing up his investigations, says : " The umbilicus is not a new structure, but simply a conversion of the fœtal embryonal tissue of the cord and its structures into formed connective tissue." The bearing of this particular anatomical aspect of the question upon the formation of umbilical fistulæ will become clearer when it is borne in mind that traumatism is a very fruitful indirect cause of tubercular disease. We have only to assume that a particular knuckle of bowel is constantly being driven against or into this weakened spot, which may itself present some slight degree of sacculation, to understand how the slight injury inflicted may be sufficient to render the bowel susceptible to the attack of the tubercle bacillus. No sooner, then, is an inflammatory process started, than the next step in the progress of the disease follows, and the infected region becomes adherent to the parietes. Once this adhesion is established the remaining stages very rapidly succeed ; the skin reddens, an abscess forms, and bursting, leaves a discharging fæcal fistula communicating with the bowel.

The probable part played by hernia in predisposing to bowel infection has already been referred to, and illustrative cases given, so that these may be instanced in support of the present contention (see page 30).

There is another anatomical factor not unworthy of consideration—the existence of some connection between the bowel and the umbilicus through the persistence of some remnant of the omphalo-mesenteric duct. A mere cord-like adhesion, not to speak of a more fully developed pouch or diverticulum of the intestine, would suffice to determine a tubercular ulcer attaching itself to the umbilicus, should the ulceration arise, as it might be induced to, at the point of attachment to the

bowel. Much of this reasoning, it must be owned, is theoretical, and open to the objection that if the question of hernia plays any particular predisposing part in the causation of tubercular ulceration and the formation of fistulæ, why do we not more frequently meet with it in the much commoner occurrence of

Fig. 22.—Tubercular ulceration of the cæcum communicating with the surface of the body by means of a fistula.   (St. Bartholomew's Hospital.)

inguinal hernia in children ?   I must leave the question un-answered as involving more discussion than it is possible to enter into here.   Suffice it to say that some explanation is necessary to account for the greater prevalence of the condition in the one place than in the other, and that none seems more feasible than that based on purely anatomical grounds, however difficult by comparison this may appear.

There are cases (see Case XIII) where fistulæ form in the median line below, instead of at, the umbilicus. In some of these, however, the connections seem more indirect. An ulcer may perforate at some deep part, and then, by gradually contracting adhesions, cause the purulent material to be directed forwards until it makes its exit through the place of least resistance, which, in the abdomen, is physiologically the middle line. I say "physiologically," because the vascular and lymphatic supply of the abdominal parietes is least in the middle line, and the tissues, also being purely fibrous in character, are less prepared to resist inflammatory invasion. Absorption is at a minimum and vascularisation at an equally low state.

Umbilical fistulæ, associated with abdominal tuberculosis, may owe their origin to other causes than those directly connected with tubercular ulceration of the intestine. As will be shown later in discussing tubercular peritonitis, they may be the result of that disease. But even as considered here, it is usual for a good deal of disease to exist in the peritoneal cavity apart from the ulcer in the bowel. And this fact carries with it a degree of importance out of all proportion to what might at first sight appear. As a consequence, in all probability, of the ulcer within the bowel, and of the inflammatory changes evoked around the seat of adhesion to the parietes, very considerable matting of the neighbouring coils of intestine frequently takes place. So that what appears little more than a simple uncomplicated communication with the bowel is in reality a very grave indication of, probably, a widespread involvement of the deeper structures. The bearing of these pathological considerations will be better understood when the subject of treatment is dealt with.

Regarding the symptoms connected with these umbilical fistulæ, there is not infrequently a history of some antecedent bowel disturbance. It is not necessary to repeat here the signs associated with tubercular ulceration of the intestine, those connected with the direct formation of the fistulæ being alone sufficient. Where more or less tubercular peritonitis is set up, in addition to the ulceration, the abdomen may be distended.; but often little more is observed than an orifice which · discharges continuously or intermittently purulent material, either simply fæcal in odour or actually fæcal in

character.   There is the greatest possible variation in the discharge which may leak from a fistula.   In one, only occasionally, and perhaps at intervals of several days or weeks, a little fæcal material escapes; in another, the entire contents of the intestine may be ejected.   Again, the fæcal discharge may vary in accordance with the seat of the communication with the bowel.   When high up in the jejunum the discharge will be lienteric, while, when lower down, and in proportion to the lowness, the ejection will approach a more truly fæcal character. As fæcal-smelling pus can never be taken to indicate with certainty communication with the bowel, the most reliable symptom is the obvious escape of intestinal gas from time to time.   This symptom it is rarely difficult to ascertain, for although the child may be too young to render an intelligible account of it, it is likely enough to be heard by those in attendance at some time or another, or actually seen in the form of bubbles of gas when the wound is dressed.   Pain is a symptom which may or may not be present.   When present, it usually appears prior to and during the escape of material from the external orifice. It may be in some cases that the fistula is too narrow to admit a free passage of the material through it, but it is doubtful if this narrowness would in itself prove a cause unless associated with some obstruction distal to the opening in the bowel.   We may reasonably assume that when once the intestine is firmly anchored to the abdominal parietes it may become kinked or strictured, and so a possible cause of obstruction to the normal onward passage of the fæces.   If, therefore, the escape externally is also obstructed by reason of a too narrow passage, pain of some degree will be experienced. This symptom is well represented in one of the cases narrated below (see Case XII), where the child always suffered from acute attacks of pain if the leakage of the fistula from any cause was temporarily interfered with.   As a further means of diagnosis the introduction of a probe will, by reason of the depth it is possible to pass, suggest that its course must be down or up the bowel.

As long as life is not endangered by the too free escape of the contents of the bowel in fistulæ communicating with the upper part of the jejunum, delay should be exercised in considering any more active measures than those of a strictly conservative kind.   Experience teaches that as the patient's

general condition improves, so these fistulæ tend to close.   It may be a matter of months, but that is only consistent with the healing of all tubercular processes.   Fistulæ which appear sluggish may be stimulated into action by scraping, just as we are familiar with in the case of chronic sinuses of a tubercular character in other parts.   But most stress should be placed upon all such means as we are wont to employ in the treatment of tubercular patients, no matter where or what the lesion.

The reason for avoiding more active and more radical measures rest upon the great difficulties that are likely to be encountered in seeking to close these fistulæ by operation. Simple as the lesion may seem from external appearances, the matter becomes a very different one when we regard the possible internal complications.   A case will probably rarely be met with in which adhesions do not exist in the immediate proximity of the fistula, and a very few in which a considerable amount of matting will not be found extending for some distance beyond the directly involved coil.   It may, therefore, prove no light undertaking to effect the occlusion of some of these fistulæ by the preliminary performance of laparotomy. This is well shown in one of the cases recorded below (see Case XIII), where a little riper experience would have dictated the wisdom of leaving matters alone, for some time at least.

But while it may be wiser to desist, in the case of children, from operation, unless from any very obvious reason, in adults radical measures may be undertaken with slightly less compunction.   Supposing, however, an attempt be made to deal with a fistula communicating with the cæcum, the surgeon must be prepared to remove the whole affected region, for no permanent cure will be likely to follow upon simply stitching up the intestinal orifice.

CASE XII.   *Umbilical fistula associated with symptoms of obstruction on occlusion of the fistula.*

Leo McC—, aged three years, was admitted into the Victoria Infirmary in October, 1904. The history given was, that when one year old he had an attack of pneumonia, and shortly after this it was noticed that his abdomen began to swell. For this he was under treatment for some months by inunction with cod-liver oil. Some diminution of the swelling appears to have taken place. But with its

subsidence a small projection appeared at the umbilicus. This reddened and burst just before admission to hospital. Fæcal matter was discharged from the orifice. When he entered the Infirmary his abdomen was noticed to be distended and bulged, more particularly in the flanks, which were dull to percussion, the dulness altering with the position of the patient. A fistula was observed at the umbilicus discharging small quantities of pus, and below this there was some localised fulness and projection of the parietes. The child was treated in the usual constitutional manner for tuberculosis. The fistula, after various periods of opening and closing, finally healed.   The child greatly improved in its general health and left the Institution practically well, after a residence of three months. In eighteen months it was again admitted. It had got into a wretchedly poor state of health, and the fistula had re-opened.   It was now noticed that the child not infrequently suffered from attacks of abdominal pain, and these were always worse when some fæcal matter was discharged from the fistula. The abdomen when examined showed, as previously, a great deal of swelling, but in addition tenderness over the whole region on palpation.   While under observation he considerably improved and put on weight; but now and again he suffered from evident attacks of obstruction manifested by vomiting and abdominal pain.   Constipation was never a marked feature.   Operation was contemplated in view of the increasing signs of obstruction; the friends, however, refused permission, and he was removed from the Infirmary. He was visited about five months later.   The fistula was discharging fæcal matter freely, and the mother stated that whenever the fistula did not so discharge he suffered considerable abdominal pain.

CASE XIII. *Fæcal fistula in middle line below umbilicus; tubercular ulceration of bowel; laparotomy; extensive matting of parts; death.*

Cecilia G—, aged three years, was admitted to the Victoria Infirmary in January, 1898. She suffered from a discharging sore on the abdominal wall of some months' duration. It was situated midway between the pubis and the umbilicus. A probe passed into the opening went for a few inches in a direction backwards and, if anything, slightly upwards. In all other respects the child seemed perfectly well. After a week's careful feeding and attention the fistula seemed to show signs of closing. A few days later, however, a very large quantity of discharge took place, dark brown in colour and of a faintly fæcal odour. From this period onward a discharge similar to that just described continued to come from the fistula; and

as at the end of ten days there was no sign of improvement operation was determined upon.

The abdomen was opened. It was then found that a coil of small intestine was adherent to the upper part of the bladder and also to the abdominal parietes. In order to obtain sufficient room to deal satisfactorily with the affected region, the abdominal incision had to be extended upwards nearly to the ensiform cartilage. This added but little advantage as all the intestines were intimately matted together. The mesentery, too, was abundantly pervaded with enlarged glands. Owing to the apparently tortuous course taken by the fistula through the adherent coils, it was found impossible to trace it to its entrance into the bowel. As the operation had already lasted an hour and a half and the child was looking very ill no further search was made. Iodoform gauze was inserted at a place where it was felt the supposed fistulous opening existed, and the abdomen closed. The child rallied from the operation and seemed to recover alright. It soon, however, showed signs of collapse, and died sixteen hours after the operation.

CASE XIV. *Umbilical fistula ; tubercular ulceration of bowel ; healed.*

Matt. K—, aged three years, was admitted to the Victoria Infirmary in September, 1894. About eighteen months before his admission it was noticed by his mother that his belly was beginning to swell, and that he was becoming very thin about his body. About six months after his illness commenced, a small perforation occurred at the umbilicus followed by a discharge of fæcal matter. The orifice was extremely small and every now and again closed, but continued to discharge in the intervals of patentcy. While in the Infirmary the child was fed well, and soon began to show bodily signs of improvement. With this general improvement the discharge gradually lessened and then entirely ceased. He left the Institution with the fistula firmly cicatrised.

In discussing fistulæ, it may be pointed out that discharging sinuses in and about the region of the umbilicus may be due to the bursting externally of suppurating mesenteric glands. This particular form of the disease, however, will be more fully referred to when considering tuberculosis of the mesenteric glands.

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1. W. HERZOG.—' Centralbl. f. Chir.,' No. 25, 1890.

CHAPTER IX

SEQUELÆ OF TUBERCULAR ULCERATION OF THE INTESTINE (continued)

THE first of these sequelæ, that of general tubercular peritonitis, it is not intended to enter into here, as this particular form of the disease will be discussed under a separate heading ; but considering that we are at present dealing with the sequelæ of tubercular ulceration of the bowel it must be briefly alluded to.   How frequent is the occurrence of a certain amount of tubercular peritonitis consequent upon tubercular ulceration of the intestine, it is not possible to say ; but judging from the number of cases in which inter-intestinal adhesions are found *post-mortem*, it seems reasonable to assume that it cannot be an uncommon sequel.   The difficulties in tracing a direct connection lie in the fact that truly significant abdominal symptoms may often be absent.   Patients may suffer at one period of their lives from unmistakable evidences of intestinal ulceration, and at another from the results of a tolerably widespread matting of the coils of intestine ; and yet, between the one and the other, there will appear little to suggest that tubercular peritonitis has been in progress.   I give two cases below which may be introduced here in support, to a certain extent, of these facts. They possess many features of considerable interest, and but for the reason just given they would better serve as illustra-

tive cases when considering tubercular peritonitis. They will be referred to again when dealing with that particular section.

The physical evidences of tubercular peritonitis dependent upon intestinal tubercular ulceration will probably be considerably affected by the kind of infection which takes place ; and what we are accustomed to regard as typical tubercular peritonitis is in all likelihood a more active and extensive form of the disease, where there is a widespread diffusion of miliary tubercles over both the visceral and parietal peritoneal surfaces. However, this is matter for discussion later. The particular point of interest, as it affects the present consideration, is the fact that tubercular ulceration of the bowel is one of the most frequent causes of tubercular peritonitis, in either a limited or an extended degree ; and the question whether we are right in assuming, in any given case of tubercular peritonitis, that the disease is the result of tubercular intestinal ulceration, will be determined by the antecedent history of bowel trouble as shown by attacks of obstinate diarrhœa, and motions containing blood or mucus.

CASE XV. *Tubercular ulceration of bowel ; tubercular peritonitis ; extensive matting of intestines ; chronic intestinal obstruction ; laparotomy ; separation of adhesions ; enterorrhaphy ; cure.*

Allan K—, aged twenty-one years, was admitted to the Victoria Infirmary in June, 1904. His statement was that twelve years ago he had inflammation of the bowels with tenderness and rigidity of the lower part of the abdomen. He was ill for about six months at this time, and seemed to make a good recovery. But about six months later he had a similar attack lasting about a similar period. From this attack he appeared to have made quite a good recovery. For the last six or seven years he has suffered from what he considered indigestion, and had only been able to keep himself fairly well by strict attention to diet and by careful regulation of his bowels.

The illness, however, for which he presented himself, dated back to about a year previously, when he was seized somewhat suddenly with severe pain in the abdomen, a little below and to the left of the umbilicus. It lasted, off and on, for the whole night and caused him to vomit. This attack lasted for four days, when he felt fairly well again. A second attack of abdominal pain, however, seized him about a fortnight later. The onset was more gradual and unaccom-

panied by vomiting, but the bowels were constipated and required an aperient to be moved. From this he recovered only to be again seized with a third attack, similar in all respects to the second, and lasting three weeks. From this period onward he appeared to have been free from any apparently acute seizures, but he had gradually lost flesh and strength, had increasing difficulty in the moving of his bowels, and had mild attacks of pain principally in the left iliac region. He had further noticed that flatus would sometimes collect in this region. It caused pain, which was immediately relieved on its passage *per anum.*

On admission he was observed to be pale and emaciated. His tongue was moist and fairly clean. His appetite fair, bowels costive. The abdomen was found to be distended all over, but neither rigid nor tender. On watching the abdomen waves of peristalsis were seen. These originated in the middle line just below the umbilicus, and travelled down to near the pubis; they then turned to the left and rapidly increased in size. In about a second a gurgling noise was heard, and the wave disappeared to reappear a few inches farther on, and finally to disappear in the left iliac fossa. Nothing could be elicited by palpation. The lungs were normal.

The abdomen was opened by a transverse incision two inches below the umbilicus, and was about three inches in length. The small intestines were all so intimately matted together that no free coils could be found. There were three places where the matting was extremely dense and tough. One was situated to the left, and involved the colon, another was more centrally placed, and the third, the worst of all, was in the cæcal region. The adhesions were mostly membranous between the coils, and these were torn and cut through, not, however, without difficulty. But at the three places above indicated the connections were so intimate that in separating them the bowel was opened in about half a dozen places. Where the openings were small the apertures were tucked in and secured by a purse-string suture, but where they were large and fæcal matter escaped closure was effected by a double line of stitches. Much matting was left untouched, but all apparently of the membranous kind. The abdomen was completely closed. The operation lasted two hours. The patient made a somewhat tardy recovery owing to the formation of a very extensive fæcal fistula which opened through the abdominal wound, and through which for a time nearly all the fæces escaped. This, however, eventually closed, and when he reported himself more than two years afterwards he was free from all abdominal troubles, with no pain or discomfort in defæcation.

CASE XVI. *Tubercular ulceration of bowel; tubercular peritonitis; extensive matting of intestines; chronic intestinal obstruction; laparotomy; separation of adhesions; ileo-colostomy; relief.*

Mrs. A. B—, aged twenty-six years, was admitted into a private nursing home in December, 1904. Her history was that when a child, she had suffered from obstinate diarrhœa. From this she apparently quite recovered until about four years ago, when abdominal pains commenced, located mostly in the left ileo-cæcal region. These pains were at first somewhat indefinite in character, and led her medical attendant to believe that they were possibly due to some intra-pelvic trouble associated with the generative organs. Later, however, they became more obviously of an obstructive character, and the association of the pains with difficulty in obtaining an evacuation, and the relief which followed upon the passage of flatus and fæces, led to the opinion that some impediment in the intestinal canal existed. The abdomen was opened in the left iliac region, and at once dense adhesions were encountered involving, more particularly, the descending colon. With considerable difficulty these were separated as far as possible, and others involving other coils of intestine liberated; but it was impossible to deal with all. Sufficient was effected to admit of the hope being entertained that the obstruction would be relieved. The pelvis was found quite free from adhesions, and the uterus and adnexa apparently healthy. All seemed to go well for about a week, when the pains returned, abdominal distension took place, the patient vomited, and the general symptoms rapidly assumed those of acute intestinal obstruction. The abdomen was reopened. The matting of the parts appeared as great as ever, and the parts previously liberated had again become intimately adherent. No other course was open but to unite a distended coil of small intestine with a free portion of collapsed colon lying in close proximity and apparently unobstructed. A bi-mucous fistula was made by performing a lateral approximation. This relieved the obstruction, and the motion subsequently passed showed that the portion of small intestine united to the colon must have been comparatively low down. The patient made a good recovery, but when last heard of, three years later, she was still subject to attacks of abdominal pain.

It is, I own, quite open to question whether these two cases can be fairly regarded as strictly representing primary ulceration of the intestine as a cause of the tubercular peritonitis. The difficulty is frequently encountered, in all cases of gross

tubercular lesions, of determining the nature of the initial lesion, for years often intervene between the earliest symptoms and the later manifestations. In both these cases there was an early history of obstinate diarrhœa ; and except in the case of the man the definite symptom of abdominal tenderness was not ascertainable. The early symptoms are, as a rule, very difficult to obtain an accurate history of, and one can only conjecture their nature from such very obscure statements as are made either by the patient or by the friends. The primary attacks of intestinal trouble, therefore, in both the above cases might have been due to tubercular peritonitis

FIG. 23.—A perforating tubercular ulcer of the jejunum. (Royal College of Surgeons.)

irrespective of any bowel ulceration, and I should not be disposed to dispute the opinion were this view held regarding them.

The condition apparently requisite for an ulcer to penetrate into the general peritoneal cavity is a necrotic process more rapid than the external protective agencies can compete with. In some of the cases there is distinct evidence, *post-mortem*, of the separation of a slough in the floor of the ulcer. This slough may involve the whole ulcer, if a small one, or simply the central part, as shown in Fig. 23. An interesting specimen was shown to the Glasgow Pathological and Clinical Society by Sutherland (1). It comprised four separate portions of the small intestine, in each of which were ulcers presenting brown

sloughs in their floors.   In one of these was a perforation through which fæcal matter had escaped into the peritoneal cavity.   Judging from my own experience, the cases of perforation have usually been those which have shown antece- dent symptoms of tubercular peritonitis ; that is to say, exten- sion and dissemination have advanced to a considerable extent before the ulcer or ulcers has or have perforated.   It is probable that this more general diffusion of the disease has in itself an indirect effect in encouraging perforation.   For not only are the vital resisting forces of the system generally undermined, but there is often a very marked thinning of the intestinal parietes, as part of the more widely-distributed emacia- tion affecting the body as a whole.

    The symptoms are somewhat variable in the way in which they manifest themselves at the outset.   In one instance they may be comparatively insidious, as in one of the cases narrated below (see Case XVII) ; while in another they may be of the most sudden and acute description (see Case XVIII).   These variations depend upon the same causes as already described in the case of perforation above a stricture (see page 68).   The larger the size of the aperture the more free the escape of the fæces, and should these be not limited by adhesions, the more acute and general will be the inflammation of the peritoneum set up.   The septic virulence of the escaped contents must also play its part in the degree of severity of the initial symptoms.   No class of cases is more difficult or more unsatis- factory to treat.   We are forced to operate, and yet the chances of success are extremely remote.   The first difficulty encountered will be in finding the seat of perforation ; for not only will there be recent adhesions, but what is far more troublesome, old matting of the parts rendering it well-nigh impossible to execute an efficient search for the lesion.   In one such case that I operated upon I was forced to give up the search as quite hopeless.   If, however, we are fortunate enough to find the perforation, we may select either to invert the aperture and use a purse-string suture or a double layer of Lembert's, or we may excise the involved portion of gut ; in any case we must take into consideration the time we may safely spend over our efforts, and the possibility of so dealing with the ulcer and its perforation that by leaving it we do not contract the canal.   Any extravasated fæces should be care-

fully and thoroughly mopped away, and no irrigation employed for fear of driving septic material into parts among adhesions where it could not be removed.

The following cases illustrate well some of the facts referred to above.

CASE XVII. *Tubercular ulcers of the small intestine; tubercular peritonitis; two separate perforations; extravasation of fæces; death.*

Andrew B—, aged two years, was admitted to the Victoria Infirmary in July, 1906. His mother stated that up to two weeks before admission he had been quite well, though never very robust. At this time he was seized with pain during the night, and in the afternoon of the next day he had a convulsion. The mother then noticed for the first time that the abdomen was swollen. Since the commencement of his illness his mother said he had been cross, somewhat feverish, and suffered from diarrhœa, but he had not vomited. There was nothing of a tubercular nature in the family history.

On admission he was observed to be very thin, but with a very full and protuberant abdomen. On examination of the latter, there was dulness to percussion all over, except at the highest part in any position. A distinct wave was obtained from side to side. A firm resistant mass was felt to the left of the umbilicus, suggesting enlarged glands. His bowels were loose, and he often vomited. His temperature varied, but ranged mostly between 100° and 103° F. ; his pulse was 132. Examination of the chest revealed nothing abnormal. For the first four weeks while under observation he seemed to improve under the special treatment he was getting; the abdomen became less distended and softer, and his temperature descended practically to normal. His bowels, however, remained loose, the motions being greenish in colour, very offensive, and at times contained undigested food. His appetite improved, but at times he had turns of sickness. It was noticed that his umbilicus sometimes protruded and looked as if it might burst; this, however, it never did. At the end of his fourth week of residence, without any marked indication of pain, he seemed to sicken, refused his food, vomited, and passed nothing *per rectum;* his temperature persistently remained high, and his pulse at about 150. Although he had a pinched appearance and looked ill, and the abdomen had much increased in size, encroaching upon the thorax, it was not painful to manipulation. He

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continued in this condition for about five days, when he died without any other marked symptoms.

The *post-mortem* was made by Dr. John Anderson. On opening the abdomen fluid in small quantity escaped; a considerable quantity of extravasated fæcal material was also met with. The parietal peritoneum had a thick layer of fibrinous exudate which was stained with the fæcal matter; the loops of the bowel were very much matted together, and the entire small intestine rested on the vertebral column in a collapsed condition. The large intestine was similarly collapsed. The stomach and liver were matted together by adhesions. Two perforations of the small bowel, of the diameter of the little finger, were observed on opening the abdomen, and from them fæcal matter exuded. The loops were separated with difficulty and showed miliary tubercles scattered over the mucous surface. The mesenteric glands were moderately enlarged, but no condition of ruptured caseous gland was seen. On opening up the loops of intestine tubercular ulceration was seen in the neighbourhood of the ileo-cæcal valve and in the ileum. No other evidences of tubercular disease were found either in the abdomen or in the thorax.

Case XVIII. *Tubercular ulceration of the small intestine; presence of old adhesions; perforation; suppurative peritonitis; laparotomy; death.*

Mrs. B—, aged thirty years, was admitted to the Victoria Infirmary in March, 1899. The statement given was that, about six days prior to admission, she was seized with sudden and severe pain in the abdomen, chiefly about the umbilicus, accompanied by vomiting. The patient was too ill to give an account of her previous history; the only facts elicited were that, for two or three days before her sudden seizure, she had felt out of sorts and not inclined for her food. Since the commencement of the attack there had been no movement of the bowels; and both vomiting and pain had continued almost uninterruptedly.

On admission the patient appeared acutely ill, with pinched face, sallow complexion, sunken eyes, dilated pupils, and dry lips. The abdominal walls were markedly retracted with only some slight tenderness on palpation between the right anterior iliac spine and the umbilicus. The pulse was soft and thready, 128; temperature 99° F.; respiration thoracic. The vomit was very offensive. The patient was lethargic, and looked generally as if suffering from toxæmia. She stated that she was free from pain.

The abdomen was opened by a median incision.   Much matting of the small intestines existed in the upper part of the abdomen.   In places they were deeply congested, flabby, and covered with large patches of lymph.   In attempting to detach them an abscess was found in the middle line shut in between coils of small intestine.   One or two bands of firm fibrous tissue were discovered and divided. An attempt was made to discover the seat of possible perforation ; but any prolonged search in this direction had to be given up owing to the extremely grave condition of the patient.   She showed no signs of recovery after the operation, and died in the course of a few hours.

At the *post-mortem* there were the usual indications of an acute general suppurative peritonitis.   On examining the bowel three characteristic tubercular ulcers were discovered in the ileum ; one of these was situated from four to five feet above the ileo-cæcal valve, another about midway between this and the valve, and a third about an inch from the second, nearer the valve.   Around this last ulcer the intestinal wall was much thickened, forming a stricture which would not admit the little finger.   In the centre of this ulcer was a small perforation of a size sufficient to allow the passage of a quill.

That my remarks should not convey a too discouraging prospect of what may only too likely happen in attempting to afford relief by laparotomy, I think the following case reported by Francis J. Shepherd (4) worthy of record.   It has still further this interest connected with it, that the symptoms suggested much more appendicitis than tubercular ulceration of the intestine.   I give the case in full as reported in the ' British Medical Journal,' because of other points of interest associated with it.

CASE XIX. *Extensive tubercular ulceration of the small intestine ; perforation ; extravasation of fæces ; suppurative peritonitis ; enterectomy ; recovery.*

J. K—, aged thirty-four years, was sent into the Montreal General Hospital on the evening of March 13th, 1906, said to be suffering from acute appendicitis.   The patient, who had for years been a hard drinker, had no history of any abdominal symptoms until three years ago, when he began to have attacks every two or three

months of so-called " appendicitis," which usually followed a drinking bout.

These attacks were marked by severe pain in the right iliac fossa, with vomiting, and usually passed off within twenty-four hours. He had occasional attacks of diarrhœa, and sometimes the stools were bloody. The history of the attack for which he was admitted to the hospital was as follows :

He had been drinking hard for two months, and after sobering up he suffered from gastritis and severe nervous prostration. For ten days before admission he had abstained from all alcohol. About twenty-four hours before being seen he had suddenly been seized with severe pain in the right iliac fossa, which radiated to the testicle and the perineum, and for which his physician gave him an opiate. Vomiting then set in, and was continuous until his admission about 3 p.m. on March 13th.

On admission he was suffering intense pain, which was referred to the median line below the umbilicus. He had also great pain in micturition, and his bowels had not been open for two days. He had some abdominal distension and great tenderness over the whole lower zone of the abdomen, but no mass could be made out. Continuous vomiting, with a temperature of 103° F. and a pulse of 128. As there was evidently peritonitis, and as the history pointed to appendicitis, operation was immediately undertaken.

On opening the abdomen to the right of the median line a large amount of stinking sero-pus escaped. The appendix was examined and found normal, but there was a good deal of thickening and deep reddening about the junction of the ileum with the cæcum. On further examination higher up in the ileum other spots of inflammatory thickened areas, presumably due to ulceration, were found, and a large coil of very much thickened and distended intestine was discovered hanging over the brim of the pelvis. On pulling this coil out a large perforation was found on the free border of the most distended portion, discharging liquid fæces. The intestines were taken out of the abdomen, and it was seen that there was almost a continuous series of ulcers extending for a distance of several feet. Before a part of the bowel could be found sufficiently healthy for section it was necessary to go upward towards the duodenum, a distance of over five feet. The coils of intestine were adherent by fresh lymph and many pockets of pus found, some of which communicated with the gut by an opening of considerable size. Nearly the whole of the small intestine was studded with dark red areas indicating ulceration.

The condition of the patient becoming alarming, the bowel was divided at points where there was the least disease and the cut ends brought together by a Murphy's button, after excising a V-shaped piece of the mesentery. This latter was much thickened and filled with enlarged glands. The bowel was returned into the abdomen after carefully swabbing out the pelvis; the wound was closed rapidly and a rubber drain inserted into the pelvis.

The patient next day was much better, and continued to improve the following days; pulse and temperature were more favourable. A week later a fæcal fistula developed which closed spontaneously in a few days. The man's condition rapidly improved, appetite was good, the abdomen soft, and bowels moved regularly. At the end of the second week he developed a high temperature and an abscess appeared at the site of the wound. On opening this some fæces escaped, which were semi-solid and of a marked fæcal odour. The fistula discharged during the next week very freely and at times almost solid fæces passed. An exploratory incision was made and a large hole, sufficient to admit three fingers, was found at the ileo-cæcal junction; evidently the large ulcer, which had been seen at the first operation, had perforated. The patient's condition was such that no more extensive operations could be undertaken, in fact he himself strongly objected, and as the ulcers were most extensive and dis-tributed all through the small intestine very great hopes of permanent relief were not held out. He left the hospital for his home in the City two months after admission, having a large fæcal fistula in the right loin. The patient was seen from time to time. He gradually failed and died of exhaustion about four months after the operation for excision of the intestine. A *post-mortem* examination was not obtained.

That primary tubercular ulceration of the intestine may be the initial focus for the spread of the disease into more remote parts there can be no doubt. Although, as a clinical fact, it may be difficult to trace cause and effect, pathologically the sequel may be substantiated by a relative comparison of the supposed age of the one lesion—the ulcer—with the other, its assumed consequence. Among the commonest sequelæ repre-senting advance of the infection will be involvement of the mesenteric glands. But for these safety filters it is probable that dissemination would be much more frequent, and much more extended. As it is, cases are not wanting to prove that the bacilli may escape from these glands, and finding their

way into the lymph-canals and venous channels infect such organs as the lungs, the liver, the brain and its membranes, and, indeed, evoke a widespread condition of general miliary tuberculosis.

The remaining sequelæ of tubercular ulceration require but very few remarks.   Lardaceous disease as a result of prolonged tubercular ulceration of the bowel is possible; but the disease, when present in association with intestinal ulcer, is usually in association also with extensive tubercular mischief elsewhere, more particularly in the lungs.   The most striking example that I have met with is illustrated in Case X.   In this instance the patient, a young woman, had suffered for several years from tubercular ulceration of the intestine.   At the *post-mortem* no other tubercular lesion than that in the bowel was discovered.

Intussusception, in like manner, is a rarity; but inasmuch as diarrhœa and a certain amount of obstructive influence exercised by the hyperplastic form of tubercular ulcer are conditions conducive to invagination, there is nothing against its possible occurrence.

Flenier (3) describes two cases of intestinal tuberculosis from Czerny's clinic, in which the pathological conditions produced by the disease gave rise to invagination.

Carcinoma attacking an ulcer of the small intestine must be of the nature of a curiosity.   The only recorded approach, and it is only an approach, to such an involvement, is a case reported by Naegeli (2).   The patient was a man, aged forty-six years. At death carcinoma of the pylorus co-existed with a malignant tumour of the ileum, and there were evidences of tubercle in the enlarged mesenteric glands, which were free from carcinomatous infection.   One explanation offered by Naegeli was that cells had passed from the pyloric tumour, and owing to the weakness of the bowel-wall engendered through pre-existent tuberculosis, had become fixed there and developed into a growth of considerable dimensions, which had been palpated during life.   It may, however, be said of this case, that although the mesenteric glands showed tubercular infection, it need not have been that this was through primary ulceration of the intestine, and, therefore, that the case could hardly be considered illustrative of the particular point raised here.   The condition is better discussed under the heading of malignant

infection of tubercular ulcers of the large bowel, which should be referred to.

AUTHORS REFERRED TO.

1. L. R. SUTHERLAND.—' Trans. of the Glasgow Path. and Clin. Soc.,' vol. vi, 1895, p. 179.

2. NAEGELI.—' Virchow's Archives,' Bd. cxlviii, 1897, p. 443.

3. FLENIER.—*Ibid.*, Bd. ci, quoted by Senn, see authors referred to, Chapter X.

4. FRANCIS J. SHEPHERD.—' Brit. Med. Journ.,' vol. ii, 1906, p. 1272.

CHAPTER X

TUBERCULOSIS OF THE CÆCUM (ILEO-CÆCAL DISEASE)

PERHAPS no portion of the alimentary canal has come to occupy a more important position in the matter of abdominal tuberculosis than the cæcum. Ulceration of this region has already been referred to in discussing the subject of tubercular ulceration of the small intestine in a general way, but it is necessary to consider it separately ; and although at the expense of some little repetition, as regards ætiology and pathology, for the sake of perspicuity, as well as out of consideration for its importance, it is desirable to draw exclusive attention to disease in this region.

Disease of the cæcum being so often associated with disease of the lower end of the ileum, and not infrequently also an affection chiefly of the ileo-cæcal valve, it is spoken of as ileo-cæcal tuberculosis. No sharp line of demarcation can be drawn between affections of these parts. For, by whatever name called, it is as often extended as it is limited, and found to embrace not only the ileum but also the appendix and the ascending colon.

ÆTIOLOGY.

The incidence of age bears some relationship to the presence of tuberculosis in this region. It is most frequently met with in the second, third, and fourth decades of life, and of these the third probably presents the largest number of cases. In a table of eighty-one cases collected by Crowder (1) there were none under ten years of age, and fifty-three occurred between the years of twenty and forty. There are, however, records of cases occurring at both earlier and later periods of life. Thus Lediard (2) records the case of a man, aged sixty-three years, but whose appearance suggested at least seventy years, while

in the opposite direction Epstein (3) narrates the case of a girl, aged five and a half years, and Guinon and Pater (34) one of a child aged four years. Sex would seem to have no bearing upon the question, for in Crowder's (1) eighty-one cases there was practically no difference, and out of thirty-five cases recorded by Hofmeister (4) eighteen were women and seventeen were men.

The relative frequency of tuberculosis in this region, as compared with tuberculosis elsewhere in the intestinal tract, is shown by statistics to exhibit a decided predilection for the cæcum and the parts immediately connected with it. Conrath (5) states that the cæcal region is the seat of tubercular disease in about 85 per cent. of all cases of intestinal disease, and out of ninety-one cases tabulated by Hofmeister (4), 55 or 60 per cent. of those where the age is stated involved the ileo-cæcal segment.

The reason of this relative frequency is probably dependent upon three causes : the abundance of lymph-follicles in the parietes of the cæcum; the prevalence of catarrhal inflammations, together with possible internal traumatic influences; and the physiological stagnation of the bowel contents. Any one of these conditions may predispose the part to infection, either through the medium of the blood circulating through the cæcal walls, or as the result of bacilli-invaded fæces contained within the canal. From the nature of the lesion so frequently found, that is, ulceration, it is probable that the latter method is the commoner. External traumatism is a possible, though probably very rare, cause. Crowder's (1) case of a blow in the ileo-cæcal region leading to tuberculosis has already been referred to (see page 30). As somewhat clearly indicating the part played by stasis of the intestinal contents, a case recorded by Grey Turner (6) is of interest. Just above the entrance of the ileum into the cæcum there was a small diverticulum. This became infected with tubercle and formed a hard mass which could be felt externally; all the rest of the surrounding bowel was healthy.

That the disease may be primary in this region there is abundant evidence to show. That in any given case the disease is primary, it must be clearly shown that there is no earlier lesion than that in the cæcal region. As illustrations of primary disease among published cases the following two may be instanced. Hall and Simpson (7) report a case which

they regarded as primary. There were tuberculous glands in the mesentery and on each side of the neck; besides these there were no other indications of infection in other parts of the body. The lungs were quite healthy. König (8), in like manner, records a case of hyperplastic disease of the cæcum which he regarded as primary. Cumston (36) regards all cases of the hyperplastic type as primary, considering that when "lesions of the lung are encountered at the same time as those of the cæcum, the latter being of the hypertrophic form, the lung involvement is the result and not the cause of the process in the intestine."

As a secondary disease no source of infection is more common than that which takes place as a result of pulmonary phthisis. Bacilli-laden sputum is swallowed, and proves a very prolific means of supplying infecting fæcal material.

The initial focus of the disease in the ileo-cæcal region may be at any part. In some cases it attacks exclusively the ileo-cæcal valve, in others this remains intact, while the cæcum proper alone manifests involvement. In other cases, again, the infected area is found more at the end of the cæcum or at its junction with the ascending colon. The reason for any seat of election may be purely accidental, and dependent upon the same cause acting at one time at one spot and at another time at another. In the later stages of the disease the involvement may be too general to be able to locate it, the whole region being more or less implicated.

PATHOLOGY.

Three types of infection may be said to exist in the ileo-cæcal region. First, there is the usual form of ulceration, such, for instance, as we are familiar with in the small bowel. A second type is that of mixed infection, where a more destructive form of ulceration is met with, due to the conjoint action of the tubercle bacillus and other pathogenic and saprophytic micro-organisms. And a third type is the hyperplastic. It need hardly be said that the line of demarcation is frequently broken by the admixture of one or other type, for the destructive influence of mixed infection may be marked at one place and absent at another; and hyperplastic thickening may co-exist with ulceration.

Tubercular ulceration, in its simplest and most typical form, presents features in common with the same lesion occurring in the small bowel. Reference may, therefore, be made to the appearances and structure of this type of ulcer as described under the heading of the small intestine (see page 32). It needs only to be remarked here that the process may be represented, on the one hand, by a large solitary ulcer involving a considerable area, or by several large ulcers ; and, on the other, by many discrete small ulcers sparsely distributed or closely associated. Much probably depends upon the stage to which the process has advanced when first observed. Frequently this simple form of ulceration is associated with the dissemination of the disease in the form of a miliary tuberculosis; and the wall of the intestine in the neighbourhood of the seat or seats of ulceration will be found abundantly sprinkled with typical tubercles visible to the naked eye.

Ulceration of the mixed type is more frequently met with in this region than elsewhere—a fact probably explained by the temporary stasis of the fæces. For, given the possible presence of pathogenic and saprophytic micro-organisms in the fæces, their lodgment here for any time admits of their attacking parts already weakened by the lesions previously effected through the agency of the tubercle bacilli. The rugged, excavated, and irregular appearance of this form of destructive ulceration has already been fully described, and need not be further dealt with here (see page 46 ; also see Figs. 8 and 9). But it is necessary to point out more in detail the secondary pathological changes which this form of the disease evokes when occurring in this particular region. And here it should be noted that these secondary changes are more the result of the action of the pyogenic cocci than of the tubercle bacilli. Inflammatory changes of an essentially septic character take place. Abscesses may form in the immediate vicinity of the seat of ulceration. These may extend towards the abdominal parietes and produce either a solitary fistula (see Fig. 22), or, by opening in several places, be the cause of many such fistulæ. The nature of the discharge varies in accordance with the direction and patentcy of the fistula. The commonest seat for fistulæ to form is in the right iliac region, but they sometimes exist at a distance from the primary seat of disease. Thus they may be found in the lumbar region, or extending down the pelvis and opening on to the surface of the vagina.

A more serious result of mixed infection is extension of the septic process to the neighbouring mesenteric glands. When this occurs these glands become the seat of, more or less, acute abscesses; and if they do not discharge into a neighbouring and adherent coil of intestine they may be the means of setting up a purulent peritonitis. The following case is of interest in this connection; it serves to show also the risk encountered in attempting to deal with the mesenteric glands, a matter that will be referred to when the subject of tubercular mesenteric glands is discussed.

CASE XX. *Ileo-cæcal tuberculosis; mixed infection of mesenteric glands; laparotomy; glands opened and stuffed with iodoform gauze; death from suppurative peritonitis.*

Thos. McG—, aged thirty-one years, was admitted to the Victoria Infirmary in February, 1902. Up to about seven weeks before his admission he had enjoyed very good health, but at this time he began to feel colicky pains in the lower part of the abdomen, mostly in the middle line. These pains continued, off and on, up to the time of admission; but about a fortnight after the commencement of his illness he became conscious of a swelling in the right iliac region. There was no tenderness connected with this. His bowels were costive, and pain would often be relieved by their movement. He found that on taking solid food he was pained, so that his diet had become restricted to liquids. His family history was good.

On admission to the Infirmary he was noticed to be pale and very thin, his tongue was coated with a slight white fur, and his temperature, as observed during the first few days of his residence, ranged between 100° and 103° F. On examination of the abdomen rigidity of the muscles existed on the right side, with pain and tenderness on pressure in the cæcal region. His chief complaint was the presence of indefinite pains all over his abdomen. On the day after his admission his bowels moved without medicine; the motion was small and fluid in character, and contained some pus but no blood. On the fourth day the swelling in the iliac region seemed to be disappearing, and percussion of the part gave a peculiar high tympanitic note, suggestive of a cavity with gas in it. On the morning of the operation the temperature was 103° F.

The abdomen was opened in the right iliac region as for an appendicectomy. The ileum, cæcum, and appendix formed a solid mass, the surface of which was covered with tubercles. Further,

examination revealed an enlarged mass of mesenteric glands and lumbar glands. Two of these presented fluctuation and were opened. They contained a quantity of fœtid pus. The generally ineffective nature of the condition seemed to suggest the advisability of not proceeding further, so the septic gland cavities were stuffed with iodoform gauze, which was led out of the abdomen at one end of the parietal wound. The patient's temperature for the first time fell to normal in the evening, and remained so during the next day. His general condition also seemed much to improve, but on the third day his temperature commenced to rise again. Some distension of the abdomen took place, hiccough showed itself, and gradually becoming weaker he died on the fifth day after the operation.

Microscopic examination of the lymph-gland and of the appendix showed both structures to be the seat of well-marked tubercle infection. The appendix also showed ulceration of the mucosa and the presence of tubercular granulation tissue. Permission to perform a *post-mortem* was not obtainable.

The manifest way in which this patient was steadily going downhill before operation leaves very little doubt that he was being killed by sepsis rather than by the tubercular process. The operation, unfortunately, hastened death; it is equally probable that it could not have prevented it coming sooner or later.

Other results of the advance of mixed infection are perforation into the general peritoneal cavity with consequent suppurative peritonitis, and the formation of extensive matting of the diseased region to neighbouring coils of intestine, so that, through kinking or contractions, obstruction may be caused.

Perhaps most pathological interest attaches to the hyperplastic form of tuberculosis, which attacks this region as its commonest seat of appearance. It, like the types previously mentioned, has also been described in discussing the pathology of tubercular stricture, inasmuch as it constitutes one of the causes of obstruction in tubercular disease of the bowel.

Spoken of most frequently as hyperplastic, it has been designated by Benoit (9) as "pseudo-neoplasm," so closely does it simulate, sometimes, a new growth. In the words of Crowder, "the thickening is due to a hyperplasia of the fibrous and muscular tissues, and the inelastic firmness to infiltration with tubercular granulation tissue." This involvement of the

intestinal parietes may be limited to one tunic only, but in the usually advanced condition in which it is met with all three coats—the mucous, submucous, and muscular—are lost in a more or less uniform thickening of new-formed tissue (see Fig. 11). Microscopical examination fails, sometimes, to reveal any of the better-known typical indications of tuberculosis ; this may be due to the fact that the sections do not happen to be carried through a place where the type exists. On the other hand, as previously indicated (see page 56), the hyperplasia may be simply the effects of a chronic inflammatory process (" paratubercular ") set up by a toxic influence primarily evoked by the tubercle bacilli (Poncet and Leriche). Somewhat in favour of an indirect effect on the part of the tubercle bacilli is the fact that they are rarely found, or if present are in very small numbers, in the hyperplastic thickening. Hartmann (35) speaks of this form of the disease when affecting the cæcum as "often included in a fibro-adipose mass which obtains a thickness of 3 or 4 cm. This fibro-adipose deposit," he goes on to add, "can be compared to that observed around the kidneys in calculous pyelitis, and in the manifestation of a chronic inflammatory process. It may spread as far as the spinal column, and contains lymph-glands. The regional lymph-glands are involved, and are more voluminous than in cancerous degeneration. As a result of the chronic inflammation of the meso-colon, whether or not there is a fibro-adipose thickening, a retraction of the tissues is sometimes produced, which displaces the colon and the cæcum upwards. The ileum, instead of being at right angles to the cæcum, then passes upwards for a length of 8 to 10 cm., and seems to continue the direction of the colon."

The extent to which the bowel may be involved in the hyperplastic process, either in its long axis or circumferentially, varies. As a rule the thickening is confined to the cæcum and its immediate neighbourhood. In a case recorded by Pilliet and Thiery (10) the thickening reached from the cæcum to the sigmoid flexure ; and in a case of my own (see Case XXII) it extended to the splenic flexure. In most instances the thickening results in a narrowing of the calibre of the intestine, and this may proceed to an extent sufficient to cause obstruction. On the other hand, Caussade and Charrier (11) quote a case where the thickened cæcum was dilated and

there existed no stricture at any point. Where, in any case, obstruction is present, the usual dilatation and hypertrophy of the part of the gut proximal to the stricture takes place. So that when the obstruction is situated at the upper part of the cæcum the lower portion, together with the appendix and the ileo-cæcal valve, may all be dilated. In illustration of this condition, as well as presenting an example of the purely un-complicated hyperplastic form of the disease, the following case may be cited. It necessarily, like all cases of tuber-culosis, serves to illustrate many other features of interest besides the particular one for which it is introduced. These, however, will be referred to in their special connections.

CASE XXI.   *Ileo-cæcal tuberculosis (hyperplastic type) ; chronic intestinal obstruction ; excision of ileo-cæcal segment ; lateral implantation of ileum into ascending colon ; cure.*

Andrew N—, aged eighteen years, was admitted into the Victoria Infirmary in October, 1904. Until the commencement of his illness he appeared never to have been troubled with his stomach or his bowels, the latter moving regularly every day. About three months before his admission he commenced to suffer from periodic attacks of pain in his right side. These attacks he found to invariably follow upon taking an extra hearty meal. They were sometimes so sharp and severe in character that they necessitated him lying down to obtain relief. They usually lasted for a few hours. He was admitted to the Infirmary after an unusually severe attack. The case was regarded as one of recurrent appendicitis.

On admission he was not observed to look particularly ill. His skin was markedly moist from perspiration. His tongue was coated with white fur. Pulse 64; temperature 98° F.; lungs normal. On palpation of the abdomen tenderness was elicited in the right iliac fossa, where there was also a sense of fulness and resistance. There was dulness to percussion over a limited area.

On opening the abdomen as for an appendicectomy, the cæcum presented, and was found to be greatly enlarged and thickened. Enlarged mesenteric glands were also felt extending up the meso-cæcum towards the middle line. The condition being considered tubercular, the ileo-cæcal segment was excised, and the ileum planted laterally into the ascending colon.

An examination of the parts removed showed the ileum to be much dilated and its walls greatly hypertrophied. On slitting up the canal

it was found to be narrowly contracted at the upper portion of the cæcum due to great hyperplastic thickening of its walls and the existence of multiple polypoid excrescences of mucous membrane. There was no ulceration visible. The ileo-cæcal valve, or rather the aperture, was dilated, as also the part of the cæcum proximal to the stricture. The appendix, which was adherent to the cæcum, was similarly much dilated and freely communicated with the bowel. The patient made an uninterrupted recovery, and left the institution at the expiration of four weeks from the time of his operation.

While it is usual for the cæcum to be more or less uniformly involved in the hyperplastic process, it sometimes happens that only a part of the bowel is implicated. Thus, in two cases recorded by Richelot, in one the posterior wall of the cæcum was alone involved, while in the other the disease occupied the ileo-cæcal angle.

The three types of tubercular infection just described may present many differences dependent upon certain definite natural causes. Thus, as time goes on, processes of repair set in, and although the disease, as a whole, may be advancing, there may be, here and there, evidences of healing. These evidences are seen in peculiar puckerings of the parts where bridges of healthy mucous membrane may exist, or where there are fibrous bands of cicatricial tissue (see Fig. 24). Cicatrisation may in some parts lead to definite stricture ; and where the contractions have been more irregular and diffuse, innumerable polypoid excrescences and vegetations covered with mucous membrane will be seen projecting from the affected parts. This is well shown in Fig. 25, and was also well represented in the specimen removed by operation from Case XXI. These small polypi are usually of the nature of intestinal adenomata. The chief point of interest connected with them is the frequency with which they are met with in all conditions of tuberculosis of the cæcum and large bowel, constituting practically a pathognomonic indication of the nature of the disease. Hartmann (35), in his interesting paper before the Medical Society of London, already alluded to, quotes two exceptional forms of the hyperplastic type of the disease. In one case recorded by Jaboulay there was a tumour in the shape of a cauliflower implanted on the upper lip of the valve. In the other case, published by Souligoux, " it took the form of an orange, ending in a point

with an orifice in the inferior side, and projecting in the cæcum like a shark's jaw."

Before concluding the pathology of ileo-cæcal disease, it may be pointed out that the vermiform appendix is frequently secondarily involved in the affection of the region. As a primary affection it will be discussed later ; but it is necessary to refer

Fig. 24.—Ileo-cæcal tuberculosis, showing bridges of mucous membrane and cicatricial tissue in the floor of two ulcers, one of which is situated in the ileum, while the other is placed around the orifice of the appendix vermiformis. (London Hospital.)

to its implication here. It is not infrequent to find a considerable amount of ulceration occupying the region around the orifice of entrance of the appendix into the cæcum, and sometimes extending into it. Whether it is involved in the disease by external influences depends apparently upon its anatomical position in relation to the cæcum. When it is found perfectly healthy it is usually free from the bowel ; but should it be retro-

cæcally placed, or in any way closely approximated to the sur-
face of the bowel, it becomes involved in the general inflam-
matory thickening of the region.

SYMPTOMS.

Tubercular disease in the ileo-cæcal segment of the intestinal
canal presents symptoms of extreme degrees of variability.   It
is not infrequent to meet with cases where, up to within a few
days of the onset of illness, the patient is stated to have enjoyed
good health, and yet where operation has revealed extreme in-
volvement of the parts.   Many pathological factors enter into
the considerations which determine the acuteness and general
nature of the symptoms.   This will have become clear in dis-
cussing the pathology of the disease.   Where, for instance, ex-
tensive ulceration exists, we may expect to encounter a train of
symptoms totally distinct from those associated with narrowing
of the canal.   And there is, again, the fact to be considered
that, inasmuch as the disease may be secondary to tubercular
mischief elsewhere, certain symptoms which may be manifested
may be due to the primary focus rather than to the affection
in the ileo-cæcal region.   It can well be understood, therefore,
that in narrating the symptoms of ileo-cæcal disease no one
symptom can be regarded as pathognomonic ; and what may
exist as a very significant indication in one case may be entirely
absent in another, although in each instance the disease may be
advanced and typical in certain respects.

With these reservations kept in mind we may consider, in the
first place, the previous history of the patient.   In some cases
there has been a prolonged history of diarrhœa, constant or
intermittent ; and, when intermittent, there may have been
equally troublesome attacks of constipation.   The motions may
contain blood, pus or mucus.   The patient may have lost flesh,
and present very obvious appearances of emaciation.   There may
be irregular exacerbations of temperature, with evening rise, and
often night sweats.   In general appearance the patient some-
times has the typical look we are accustomed to associate with
certain forms of tubercular disease—a clear transparent com-
plexion, pink cheeks, bright eyes with dilated pupils, and a
moist clean tongue.   On the other hand, cases will be met with
where quite the opposite appearances are present.   The patient

is sallow in complexion, comparatively stout, skin rough and dry, tongue furred, and breath offensive. The appetite is, as a rule, poor, and not infrequently there are what the patient has been accustomed to regard as bilious attacks with vomiting and headache.

Pain at some time or other in the course of the disease is almost always present. As a referred symptom it varies con-

Fɪɢ. 25.—Ileo-cæcal tuberculosis, showing stricture at the seat of the valve, numerous typical ulcers in the cæcum, and a conglomeration of polypoid excrescences of mucous membrane above. (Victoria Infirmary, Glasgow.)

siderably both in degree and situation. For the same reasons as pain is explained in appendicitis, that is to say, by a reflex through the mesenteric nerves, the spinal cord, and the parietal nerves, pain is felt in the epigastric, umbilical, and iliac regions, as well as, sometimes, diffusely over the whole abdomen. It is this similarity in distribution that has so frequently led to mistaken diagnosis in the matter of disease in the ileo-cæcal region. The more chronic and slow, however, the progress of the

disease, the more likely does it seem that the pain is limited to the region of the affected parts. It is remarkable how extensive may be the involvement of the ileo-cæcal segment without any manifestation of pain ; on the other hand, should the disease, however limited, cause stricture and so obstruction, pain becomes a very severe and characteristic feature. In these particular cases the pains are frequently intermittent, and often evoked by the ingestion of food. The patient complains of attacks of " gripes," and is distinctly conscious of a sense of effort on the part of the bowel to overcome some obstruction. These " vermicular " sensations become specially significant when they " work" into the right iliac region, and then disappear as pent-up gas escapes into the colon beyond the stricture. This same action on the part of a dilated and hypertrophied bowel may cause gurgling noises, the result of a churning up of gas and fluid fæces.

The amount of local pain experienced in the ileo-cæcal region is often determined by the extent to which active inflammatory changes have taken place. When the inflammatory process, which is mostly the result of mixed infection, involves neighbouring muscles, pains are often evoked by any movement of those muscles. Thus, in a case recorded by Mayo Robson (12), the patient noticed "that her side was painful when she turned and that she could not bear the pressure of her stays." This was doubtless due to inflammatory invasion of the lumbar muscles. In another case, reported by Eve (13), movements of the thigh gave pain from probable involvement of the psoas and iliacus muscles. The extension of the inflammation into the pelvis and implication of the bladder may lead to frequent and painful micturition.

Turning to more local manifestations, we shall find in some instances that a marked swelling, either fixed or movable, can be felt. When movable it is usually due to the fact that the infection is of the hyperplastic type, and that the bowel is converted into a solid tumour-like mass, capable of being displaced from side to side. In this type of case there is but little tenderness in manipulating the parts. On the other hand, where extensive ulceration exists, coupled with mixed infection, the abdominal muscles covering the region are spasmodically contracted, and render, therefore, palpation both painful and impossible for deeper examination. When the inflammation

has advanced to pus formation the characteristic symptoms of an abscess may become manifested. In such cases as present, for the first time, fistulæ in the region, indicating that an abscess has burst or been opened, their peculiar reluctance to heal may be taken as a very suggestive sign of the probable tubercular nature of the disease which has caused them. In cases where the disease has caused contraction and narrowing of the canal very characteristic and suggestive signs may be present. At certain times, especially when abdominal pain is felt, a visible tympanitic swelling may be observed in the right hypogastric and iliac regions. This swelling is intermittent and disappears with the escape of gas through the constricted orifice. It is in these cases, also, that palpation of the part may evoke splashing and gurgling—a symptom which exists in proportion to the dilated condition of the ileum above the stricture.

DIAGNOSIS.

It will have been impossible, in reading through the above description of the symptoms in tubercular disease of the ileocæcal segment, not to have been struck with the fact of how many symptoms there were which as much suggested other diseases as the particular one under discussion. It is this frequency in similarity and the want of any constant and distinctive feature that has so often led to an erroneous diagnosis.

Before dealing with the differential aspect of diagnosis some of the more suggestive indications of the disease may be considered.

Chronic disorders of the bowels extending over several years, in patients between twenty and forty years of age, rank as some of the foremost indications of tubercular disease. And greater force is added to the significance of the symptoms if, with obstinate diarrhœa or constipation, there is pain and discomfort in the right iliac fossa, coupled with obvious emaciation and loss of appetite. It is the chronicity and slow progress of the affection that seems best to separate tubercular disease of the ileo-cæcal region from the other complaints which so closely resemble it. Further, the existence of pulmonary phthisis suggests a possible cause, and, therefore, a greater reason for believing that the iliac mischief is tubercular also.

Two means have recently come to our aid which, it is

reasonable to hope, may in time lead to a considerable degree of certainty in the diagnosis of tubercular disease in this particular region ; they are, the reaction of the system to tuberculin injections or inoculations, and the determination of the opsonic index. I have tried the former with a certain amount of success (see page 74). A description of the methods to be employed may, however, be repeated here, as they differ slightly from those previously given. As regards the test for obtaining reaction after the injection of tuberculin, I quote from the paper by Löwenstein and Kaufmann (14), as abstracted in the epitome of the ' British Medical Journal.' These authors " recommend that for purposes of diagnosis the dose of the ' old tuberculin ' should not, as Koch advised, be increased when no reaction follows the first dose, but that in order to obtain a reaction the same amount of 0·2 mg. should be injected, if necessary, four times over within from twelve to sixteen days, and only when these injections have caused no reaction should larger doses be employed. The method recommended by the authors is especially suitable for cases of recent tuberculosis with doubtful physical signs—that is, just for those cases in which a correct diagnosis is of the greatest importance. The method is based upon the fact that the first injection, even if no obvious reaction occurs, yet temporarily increases the sensitiveness of the organism towards a second injection, and the second again towards a third. This increase of susceptibility is best seen when the amount of the tuberculin used is small, and it is so well marked that the reaction after the fourth injection of 0·2 mg. may be little less in intensity than that after a dose of 10 mg. After the first four injections, if no reaction has been obtained, the dose is increased to 2 mg., then to 5 mg., and finally to 10 mg. The injections are made in the morning ; the patient is kept at rest in bed, and the temperature is taken every three hours. The reaction, according to Koch's rule, is considered positive if the temperature rises at least 5° higher than the mean temperature, and there are, at the same time, marked subjective symptoms. A three days' interval, at least, is left between each injection. A tendency to hæmorrhages and heart affections, when they are not too advanced and occur in young people, do not contra-indicate the use of tuberculin, but the injection should not be made in cases of kidney disease

or where pregnancy is present. The following are the important points in determining the value for diagnostic purposes of any new method of injection : (1) That tuberculous patients react to the injections; (2) that sound persons fail to react; and (3) the effect upon healed tuberculosis."

The diagnostic value of the opsonic index and the method of employing it is thus expressed by Herbert French (15) : " In the case of tubercle bacilli the opsonic indices of a series of healthy individuals may vary from 0·8 to 1·2, or thereabouts, but in tuberculous patients the index may be as low as 0·3 or as high as 1·8, or even higher. The estimation, therefore, may be of considerable diagnostic value in cases where there is doubt as to whether the lesion is tuberculous or not. If the index is below 0·7 or above 1·3 the argument will be in favour of tubercle, the resisting power of the patient being low in the first case, high in the second. . . . It has been found that after injecting $\frac{1}{5000}$ mg. of Tuberculin R. into a healthy man the opsonic index falls slightly for about two days, then rises to slightly above normal, and then returns to what it was originally. A similar injection into a tuberculous patient is followed by a considerable fall in the opsonic index, the latter remaining below what it originally was for a week or more, by which time it has begun to rise again above what it was before. The initial fall after the injection is called the negative phase. This negative phase is quite short in healthy people, long in tuberculous subjects, so that we have here an additional means of diagnosis."

There is one obvious drawback to the employment of either of these methods for exclusive diagnostic purposes, and that is, that should there happen to be tubercular foci in other parts of the system—of which there may be no symptoms—a positive result would ensue, and possibly, therefore, an erroneous impression given of the true nature of the swelling in the iliac fossa, which might be non-tubercular.

In considering the question of differential diagnosis, two diseases stand out prominently as being those most frequently mistaken for tuberculosis of the ileo-cæcal region. These diseases are inflammations of the vermiform appendix and carcinoma of the cæcum.

There are very few surgeons of any experience who have not, at one time or another, diagnosed a case as appendicitis

or malignant disease which operation has revealed to be tuber-
cular.   Numerous cases have been published illustrative of
such an error in diagnosis, among which may be quoted those
by McArthur (16), Page (17), Crawford Renton (18), and
Turner (6).   As, however, we have become alive to the possi-
bility of this mistake, and also of the frequency of tubercular
disease in the right iliac region, a more careful scrutiny of the
patient's general appearance and of the previous history of
the case will enable us to avoid errors in diagnosis.

The symptom of pain can never be truly differential, for the
good reason that the anatomy of the nerve supply necessitates
that it must be identical in all cases.

The difficulty of diagnosis is easier to overcome in the case
of adults than in that of children; for as a rule tuberculosis
of the ileo-cæcal segment in the former is likely to present a
series of more distinctive symptoms than in the latter.   The
existence of pulmonary complications may generally be taken
to point to the right iliac symptoms being due to tuberculosis
rather than to simple appendicitis.   The presence of a distinct
swelling in the ileo-cæcal region of some duration, and occurring
in an emaciated patient, with occasional rise of temperature and
night sweats, indicates much more tuberculosis than appendicitis.

The question of carcinoma, except for its comparative infre-
quency in the cæcal region, has led almost to as many mistakes
in diagnosis as in the case of appendicitis.   There is, how-
ever, this marked distinction, that with malignant disease the
question is rarely raised except in the presence of an obvious
tumour in the right iliac region.   The age of the patient will
often assist, though it cannot engender certainty, for while car-
cinoma is rare in young adult life tuberculosis is not infrequent in
patients over forty years of age.   Unfortunately, the symptoms,
both local and general, may be absolutely identical in both
cases, and it is only by taking into account certain suggestive
indications in the previous history and relationships of the
patient that a diagnosis based on probabilities can be made.
As in appendicitis, literature affords many examples of mis-
taken diagnosis.   Among illustrative reports may be instanced
those of Charters Symonds (19) and Sachs (20).   So strongly
suggestive of carcinoma were the indications in Sachs' case
that he thus expressed his diagnosis : " Tumeur intestinale de
la region ileo-cæcale, sans doute de nature carcinomateuse."

Differential diagnosis may be assisted by making a blood examination, the existence of leucocytosis being a symptom in favour of malignant disease. Equally the reactionary effects of tuberculin injections will serve to suggest tubercular disease. In many cases, however, it may be said that the diagnosis will remain uncertain until cleared up by an exploratory incision, or by the subsequent microscopical report of the pathologist.

With the exception of the above two conditions of appendicitis and carcinoma, there are not many others that are likely to lead to a mistaken diagnosis. In one of the cases quoted by Eve (13) the attacks of pain in the epigastric region led to the belief, at first, that the lesion was gastric ulcer. In one of my own cases the condition was first diagnosed as enteric, and the patient sent to a fever hospital; doubt, however, being entertained by the officials it was transferred to my surgical ward (see Case XXIII). In a case recorded by Pilliet (10) the hard character of the tumour in the right iliac region led to the opinion, at one time, that it was a fibroid, at another, that it was an osteoma. A kidney has been known to occupy this region, as also an affected Fallopian tube or ovary ; actinomycosis, when occurring in this region, can only be diagnosed after the formation of sinuses, when sulphur-like granules may be discovered in a reddish-yellow puriform discharge ; chronic adenitis of the iliac glands is another possible source of error, but these conditions are too rare to need more than a passing notice. The differential diagnosis must rest upon a careful consideration of the facts connected with each case, and if an open mind is held, and a knowledge exists of the possible errors that lie in wait for hasty diagnosis, it will become less and less likely that mistakes will be made in distinguishing ileo-cæcal tuberculosis from those diseases which often so closely resemble it.

PROGNOSIS.

Judged by the pathological appearances so frequently seen in ileo-cæcal tuberculosis, it might well be regarded as a disease presenting very gloomy prospects for the patient, and a limited experience might equally well tempt to the prognosis that without removal little hope could be entertained of a cure. However, there is abundant evidence to show that the

most advanced involvement of the ileo-cæcal segment is not without the powers of Nature to overcome ; and some cases will be quoted later to demonstrate the fact that where the surgeon has been baffled in the attempt to excise the affected segment, Nature has succeeded in restoring the parts to a normal, or functionally active condition.   But given a distinct case of ileo-cæcal tuberculosis, many adverse possibilities lie in wait for the sufferer, and serious risks have to be run if the case is to be left solely to Nature's efforts.   It is these risks that encourage the opinion that greater safety lies in immediate operative interference than in the exercise of delay. In studying the pathology of the disease many of these risks will have become quite clear.   Where there is ulceration of the mixed type, inflammatory complications of some kind are more or less certain to appear. Abscess may form, and, bursting externally, leave a troublesome and persistent fistula ; or, as in a case recorded by Maitland (21), several fistulæ.   Operation may then become imperative, and will have to be conducted under much more unfavourable and difficult conditions than if no such complication existed.   Again, the mixed infection may lead to suppuration of the mesenteric and lumbar glands with a fatal result, as shown in Case XX ; and yet further, a suppurative peritonitis may be suddenly lighted up as in an interesting case reported by Johnson (22).   The patient was a young woman, who, while in hospital for treatment of multiple tubercular lymphatic glands in various parts of the body, was suddenly seized with acute abdominal pain, and the rapid development of symptoms of general peritonitis.   There had been noted in the right iliac fossa a tumour of considerable size. As this region seemed to be the seat of the chief pain an incision was made into it. A very extensive purulent peritonitis was discovered, and the cæcum and the first part of the ascending colon were involved in tubercular disease.   The apparent cause of the peritonitis was that one of the tubercular masses connected with the cæcum had broken down, and so infected the peritoneum.

Short, however, of actual suppuration, extensive adhesion may form between neighbouring coils of intestine, and lead to symptoms of obstruction. Operation under these circumstances might prove of the most difficult, if not impossible, nature. As another cause of obstruction, and one more frequently met

with, is narrowing of the intestinal canal, as the result either of cicatricial contraction or of hyperplastic thickening.   In cases where there is much thickening and enlargement of the part pressure may be exercised upon the ureter.   Cumston (36) mentions an instance of hydro-nephrosis resulting from such an influence.

The existence of tuberculosis in the ileo-cæcal segment of the intestinal canal forms no exception to the rule that the presence of a tubercular focus in any part of the body renders the patient liable to a generalised infection.   So far as this particular part is concerned, there is one path by which infection is peculiarly prone to proceed, and that leads to the involvement of the general peritoneal cavity.   As will be later pointed out, one of the causes of tubercular peritonitis is tubercular ulceration of the bowel.   But whether by this route as a primary procedure, or more directly through the blood, a general miliary tuberculosis may take place.   In this connection the following case is worth recording.   Although no *post-mortem* was obtainable, the fact that the patient died of evident tubercular meningitis suggested—in conjunction, also, with what was found at the operation—that there was a general miliary tuberculosis.

CASE XXII. *Tuberculosis of cæcum, ascending colon, and transverse colon; tubercular peritonitis; laparotomy; tubercular meningitis; death.*

Mrs. C—, aged thirty-four years, was admitted into a Private Nursing Home.   She had enjoyed fairly good health up to the onset of her illness, which commenced about nine months before her admission to the home.   Her initial symptoms were those of indigestion unaccompanied with pain, but later pain began to be felt after taking food; and sometimes before taking her meals there would be a sense of craving for something.   A little care in regard to what she took prevented any symptoms; but in the course of about seven months she commenced to be troubled with colicky pains in the abdomen, somewhat generally distributed.   These gripy attacks would sometimes last all night, and prevent her from sleeping.   The bowels at these times did not move.   From this time onward, and at intervals of about a week or ten days, she would suffer from attacks of gripes, sometimes accompanied with vomiting.   She never seemed to suffer from diarrhœa and only occasionally the bowels were constipated. There seemed to have been no rise of temperature during her attacks,

and no very definite signs of obstruction, with the exception that sometimes during a gripe a sense of relief seemed to follow upon the passage of gas. Her menstruation was quite regular; she had had no family. She was fresh coloured in complexion, thin, and had lost about two stone in weight in the last year.

On examining the abdomen it was seen to be tumid and distended; there was tenderness in the right hypochondriac region, and a tumour about the size of a walnut was felt at about the centre of the ascending colon. It was hard to the touch, but not painful. A distinct gurgling of wind was heard when pressure was made in this region.

On the fifth day after being admitted to the Home she was quite well in the morning, but at 1.30, when the nurse entered the room to take her some beef tea, she found her lying on her side with pale pinched face, eyes staring, pupils contracted, very feeble pulse, no indication of pain, and semi-conscious. She remained in this condition for about twelve hours. She then completely recovered, except that her appetite was poor, and she did not care to take food. The abdomen seemed to become more tumid and to increase in size. As she remained fairly well for the following fortnight it was decided to operate. On opening the abdomen some pints of clear straw-coloured fluid escaped. The peritoneum was then seen to be sprinkled all over with tubercles. A further examination of the parts showed the large bowel from the cæcum to the splenic flexure to be converted into a nodulated mass about the thickness of a broom-stick. Considering the diffuse distribution of the disease nothing further was done, and the abdomen closed. The patient recovered from her operation, and remained free from symptoms for a few days. She then, however, began to have fits, coupled with convulsive movements of the face and eyes. These convulsive seizures increased in frequency, until one severe one left her in an unconscious condition, from which she did not recover, and died quietly. No *post-mortem* was obtained.

Apart from the simple question of prognosis this case presents many points of interest. From the extent of the disease involving the large bowel it seems fair to assume that the general peritonitis found at the operation was probably secondary to the intestinal infection. The type of this latter was of the hyperplastic form, and involved a very considerable length of the gut, reaching as far as the splenic flexure. A striking feature about the symptoms was the absence of diarrhœa, and the comparatively slight discomfort from constipation. Although the symptoms of obstruction were not

particularly marked, as might have been expected from the extensive disease found at operation, nevertheless the constant recurring attacks of gripes were doubtless suggestive of some obstruction. The most marked, and, perhaps the most suggestive feature about the whole case was the steady loss of weight, which was in progress before any other symptoms of particular significance became manifest.

In addition to what may be termed the more specific adverse possibilities, there is the general constitutional effect of the prolonged presence of the disease slowly undermining the patient's strength, and causing death by inanition and toxæmia. I cannot do better than give the following case as an illustration of the natural course which the disease may take to a fatal issue in the absence of operative interference. It is some years since the case came under observation, and at a period when abdominal surgery had not reached its present pitch of perfection; otherwise it would be considered almost inexcusable that such a case should have been allowed to slowly linger on without the relief, and possible cure, which operation could doubtlessly have afforded. However, it will serve the purpose here of showing what may be expected in any case if too much importance is attached to delay, and to the recuperative powers of Nature.

Case XXIII. *Ileo-cæcal tuberculosis; chronic intestinal obstruction; no operation; death.*

A boy, aged fifteen years, was sent into the Fever Hospital certified as enteric. As some doubts were entertained by the fever officials regarding the correctness of the diagnosis, he was transferred to the Victoria Infirmary. The history given was that about eighteen months ago he commenced to suffer from pain in the right iliac region, intermittent and sometimes severe. Tenderness over the painful part was not noticed, and his bowels continued regular. He frequently suffered from headache, and his appetite was poor. This state of matters continued for four or five months, at the expiry of which he seemed quite to regain his health. He remained well for some months, when he was again attacked by an illness characterised by pain in the right iliac region, headache, frequent vomiting and profuse diarrhœa. These symptoms lasted for about a week, when he seemed rapidly to get well again. The illness from which he now

suffered started about three weeks ago, and, like the previous attack, was characterised by pain in the iliac region, headache, and loss of appetite. There had, however, been no vomiting as on the previous occasion, but diarrhœa had been profuse.

On admission to the Victoria Infirmary the boy was noticed to be terribly emaciated, with pale and sallow skin, pupils dilated, pulse 70, temperature 98° F.; tongue moist and smooth.   On examination of the abdomen, intestinal coils were seen well outlined against the thin parietes, and peristaltic waves were visible.   These movements were most noticeable when the abdomen was subjected to slight friction. In the right iliac region a rounded elongated mass was palpable.   It occupied the upper part of the fossa, and took a direction upwards and outwards; it was tender on pressure.   His bowels were very loose, and frequently moved.   The stools were generally of a pale yellowish colour, and very offensive.   During the seven weeks prior to his death his symptoms showed considerable variation; sometimes the abdomen was more distended than at others; and sometimes more tender.   The bowels had occasionally to be opened by enemata.

Three days prior to his death vomiting became more pronounced, and the abdomen somewhat more distended.   His temperature was more frequently below normal than above it, and only on three occasions did it reach 100° F.   He weighed on admission 2 st. 8 lb.; and three days before his death he weighed 2 st. 13 lb., so that he had slowly been putting on weight.   He suddenly became collapsed, and died without any other marked symptoms.

At the *post-mortem* both lungs were found to contain tubercular foci.   On the under surface of the left lobe of the liver were two tubercular nodules.   Around the cæcum there was considerable matting, and two or three abscesses existed in association with the ulcers on the cæcal wall.   The whole diseased area was well hemmed in with adhesions; and to these some of the neighbouring coils of intestine were bound down.   The ileo-cæcal valve was surrounded by a mass of thickening which considerably constricted it.   The small intestines were greatly distended, while the large were contracted, the relative calibre of the two being as 4 to 1.

Judging from the condition of matters revealed at the *post-mortem*, it is impossible not to believe that excision of the affected region would have resulted in a perfect cure, so far as the intestinal disease was concerned.

Carcinoma, as a result of chronic tubercular ulceration in the ileo-cæcal region, is probably extremely rare ; but that such a

result has happened renders it necessary to include the consideration in the question of prognosis. The theory originally propounded by Rokitansky (23) several years ago, that carcinoma and tuberculosis were mutually antagonistic, that the presence of the one rendered the patient immune to the other, finds but few supporters nowadays ; for numerous published statistics have come to show the frequency with which the two diseases co-exist in the same patient. The question of most immediate interest is, that with this co-existence, does the one actually predispose to the other ? There are not wanting advocates on both sides, and Crowder (1), in his excellent article already referred to, brings together various authorities who argue both for and against one view or the other. It is not necessary to discuss this general aspect of the question further ; it is only of interest to us in so far as it concerns the possibility of tubercular ulceration of the bowel becoming subsequently the seat of carcinoma. In illustration of such a sequel the following case recorded by Crowder (1) is worthy of note. The patient was a man, aged fifty-four years. As the result, apparently, of a blow received in the right iliac region, a swelling developed, which, when incised, proved to be an abscess. The swelling, however, failed to disappear, and a fistula remained. He died in about a year, and at the *post-mortem* a mass about the size of a fist was found occupying the iliac fossa. When examined microspically the tumour was seen to consist at one part of carcinomatous tissue and at another, of tubercular. Crowder (1), in commenting upon the case, observes : " From the few facts in the clinical history, it seems more than probable that this case is one of perforating tubercular ulcer of the cæcum secondarily invaded by carcinoma. The fact that the inguinal fistula was of so long standing speaks strongly for such a sequence. Further evidence is found in the macroscopical findings, in that the malignant growth takes its origin from the margins of an old tubercular ulcer. Although tubercle bacilli were not found in the base of the ulcer itself, it seems clear from the histological findings in the wall of the cæcum, and the presence of tubercles and tubercle bacilli in the adjacent lymphatic glands, that the lesion must be of such an origin. There is a well-marked extension of the tubercular process to the regional lymphatic glands, while the malignant growth remains localised in the cæcal wall. In the lungs and peri-bronchial lymphatic glands there are a few healed

tubercular foci which may have given rise to the development of the primary disease of the cæcum."

As further illustrating the presence of the two diseases in the ileo-cæcal segment, although it is not possible to say that the one depended upon the other, a case recorded by Caird (24) may be referred to. The patient was a woman, aged forty-six years. " A tumour was felt in the right iliac fossa about the size of a Tangerine orange. The tumour was removed, and on examination of the mass the colon was found hypertrophied with tubercular foci; the walls of the cæcum showed cancer in all stages of colloid change ; there was also evidence of tuberculosis. In the small intestine marked colloid cancer was seen, particularly on its outer aspect."

Gloomy as is the prognosis on one side, it is remarkable how many cases have been recorded of recovery from a condition which has been considered too advanced to admit of operative interference, or, perhaps, it should be more properly said, of removal of the diseased segment of bowel. It, however, only bears out the fact, demonstrated in so many other parts of the body, that tuberculosis is not a malignant disease, in the sense that Nature cannot, in many cases, overcome the affection. It is in all places a mere struggle between the attacking forces of the tubercle bacilli and the resisting powers of the human system. And just, therefore, as Nature is capable of conquering her enemy in other parts of the body, there is no reason why she should not sometimes overcome him when the seat of the struggle is limited, more or less, to the ileo-cæcal segment of the intestinal canal. Could we, by any means, be able to gauge the power which the system possesses at any time in reserve, we might, in many cases, be able to give our prognosis accordingly ; and possibly we may yet come to do so, as we understand more fully the value that may be attached to the determination of the opsonic index. Until then it comes to us more as a surprise than an expectation that an advanced condition of ileo-cæcal tuberculosis should disappear, and the patient recover, without any serious operative assistance on our part.

I propose to refer to a few published cases illustrating what may be regarded as natural cures of the disease.

Pearce Gould (25) records the case of a young woman where he opened the abdomen and found extensive disease of the

ileo-cæcal segment.   Removal not being considered feasible, the parts were left untouched and the abdomen closed.   The patient henceforward rapidly improved, and when seen a year after she was perfectly well.   W. J. Mayo (26) operated upon a married woman, aged thirty-seven years.   " The walls of the cæcum and ascending colon were found to be enormously thickened, and, in places, ulcerated patches, well roofed in by thick plastic deposit, could be made out.   .   .   .   The colon was opened, and extensive tubercular ulceration could be seen. The abscess-cavity was iodoformised and packed with gauze, and the opening in the bowel repaired and covered with an omental graft.   .   .   .   Four months after the operation the mass was very much less prominent, and there was a gain of 30 lb. in weight, and a corresponding improvement in general health could be noted."   Alexis Thomson (27) refers to the case of a woman, aged thirty-six years.   The abdomen was opened and extensive tubercular disease found involving the cæcum, the appendix, the ileum, the adjoining peritoneum and mesenteric glands.   Nothing was attempted and the abdomen closed. The patient recovered and all the symptoms entirely disappeared.   Nové-Josseraud (28) relates having performed laparotomy upon a child, aged twelve years, for a swelling, the size of an adult fist, in the region of the cæcum.   The operation demonstrated the existence of extensive tubercular disease of the cæcum and the adjacent portions of the ileum and ascending colon.   The affected parts were not interfered with, except that they were wiped gently with iodoform gauze, and dusted with a thin film of iodoform.   The operation was followed by a speedy and permanent recovery.   As a further illustration I cannot do better than give in full the following case, which came under my own observation.

CASE XXIV. *Ileo-cæcal tuberculosis ; fistula ; laparotomy ; removal of disease not possible ; dusted with iodoform ; complete recovery.*

Georgina D—, aged twelve years, was admitted to the Victoria Infirmary in May, 1904.   Up to eight days before admission it was stated that she had always enjoyed good health, but at this time she began to complain of a dull gnawing pain in the right iliac fossa. There was no sickness or vomiting, and her bowels were quite regular. The following day, although still suffering somewhat, she was allowed

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to get up and about. The two succeeding days she was still able to go about as usual, but on the night of the fourth day she had a comparatively sharp attack of pain in the right iliac region. On the eighth day the pain had again subsided, and she was once more up, but at this time it was noticed that she was somewhat feverish, and there was rigidity of the abdomen with tenderness on pressure. Up to this time the bowels had moved regularly, and nothing abnormal had been detected in the motions.

On admission the child was noticed to be of good colour and well nourished. The tongue was moist and coated with a slight white fur, but her appetite was good. On examination of the abdomen neither distension nor rigidity was present, and there was no tenderness on palpation. A soft semi-fluctuant swelling, however, about two inches in length, was felt in the appendix region. The thoracic organs were healthy, and the urine normal. Both lungs and pulse were also normal. The case was diagnosed as one, possibly, of appendicitis. The abdomen was opened by an incision in the right iliac region. A matted mass was encountered consisting of the cæcum, omentum, and numerous enlarged glands. With considerable difficulty the appendix was found lying retro-cæcally, and containing a large fæcal concretion. The appendix was removed, and it was then found that the thickening seemed to extend up the colon. Nothing further was done, although it was considered probable that the condition was one of tubercular disease of the cæcum and colon. The appendix was submitted to the pathologist for examination, and the report received was that the condition was one of simple appendicitis without any tubercular element. The child remained in the institution for several weeks, during which time it considerably improved in health. It subsequently left with a discharging sinus in the right iliac region.

Eight months later she was re-admitted to the Infirmary to be treated for the discharging fistula. The abdomen was re-opened, when a very extensive matting of parts was found, and tubercles were seen sprinkled over the bowel surface. The adhesions extended up the ascending colon and down into the pelvis; they constituted such a gross involvement of the parts that any attempt at removal seemed impossible. The deep parts, therefore, were freely dusted with iodoform and stuffed with iodoform gauze, and the wound all but completely closed. In the course of a few days a slight fæcal discharge took place, and this occurred, off and on, for some weeks. She improved in health, taking her food well, and passing well-formed natural stools. When seen a year later she was in excellent health, and at active work in a shop. An examination of the right iliac

region showed an entire absence of any tumour or resistance in the cæcal area.

It is fair to argue that some of the above illustrations, including that of my own, are not strictly cures by Nature's unaided efforts, and that the opening of the abdomen, and, much more, the execution of short-circuiting, are methods of treatment which have their own special beneficial influences. This may be so, but they at least prove that the disease, when not removed by operation, can be dispersed by powers within the system.

Possibly, in considering the question of prognosis, some distinction should be drawn between the types of the disease. Hartmann (35) believes that the hyperplastic form never retrocedes, and agrees with Bérard and Patel " that spontaneous evolution of the hyperplastic tuberculosis of the cæcum, such as we know to-day, is fatal."

Prognosis, as it bears upon total excision of the ileo-cæcal segment, is distinctly favourable. Quite a number of successful cases have been published. The operation, however, is often a difficult one, and the chances of success turn not a little upon the skill and experience of the operator. Any attempts at giving statistics are worthless, for only successful cases are published, and individual experience, in a class of cases that varies so much in the extent and nature of the disease, must be too limited to be of much value in this respect. Both, however, tend to support the view that excision, when properly executed, is a perfectly safe operation.

TREATMENT.

Considering the nature of the disease as demonstrated by pathological investigation, and, more indirectly, by the possible future progress of the case when purely conservative measures are adopted, it seems fair to conclude that operative intervention is the only method of treatment worthy of consideration. This conclusion may be accepted with greater confidence in view of the advance made in recent years in the operative technique of abdominal surgery.

Excision of the ileo-cæcal segment must ever be regarded as a serious operation, but its degree of severity presents a

very wide range; for, from a comparatively easy procedure, there may present every kind of difficulty up to a condition where removal is practically impossible. From my own experience, and from that gleaned from various published cases, there is little doubt that laparotomy should be performed, and by laparotomy I mean that the affected region should be exposed, and treated in accordance with what is revealed by the exploration. The treatment, therefore, of the disease resolves itself into a consideration of the various courses which should be pursued, when once the part is properly exposed to view, and to tactile investigation.

Considering, in the first place, the question of excision, the determining features will rest upon the mobility of the parts involved, their comparative freedom from serious implications of neighbouring coils of intestine, the general extent of the disease, and the health and age of the patient.

As regards the age of the patient, adults will stand better a prolonged operation than children, and further, less severe measures afford a better chance of ultimate recovery in the latter than in the former; so that, assuming age to be the only factor to be considered, greater lengths towards removal may be attempted in the adult than in the young.

Where pulmonary complications exist in conjunction with ileocæcal disease, the extent of the former will determine the risks it is right to run in dealing with the latter. Except where operative interference is demanded for obvious obstructive symptoms, it is possible, given pronounced pulmonary disease, no radical attempts at extirpation should be attempted.

When it is found that the attachments of the parts to neighbouring coils of intestine are such as to cause injury to the latter in attempts at separation, excision should not be entertained; and further, when the disease is of the hyperplastic type, and has invaded some length of the colon also, it will be matter for serious consideration whether the whole involved part should be removed.

It should be further remembered that when great difficulty is encountered in separating an intimately adherent mass the ureter may be damaged. Such an accident happened to Czerny, who was compelled to excise the kidney.

Another factor influencing the question of excision is the co-existence of tubercular peritonitis. Here, again, it is impos-

sible to lay down any definite rule.   Much must depend upon the nature and extent of the diseased part to be removed, and upon the general state of the patient.   Given fairly favourable conditions, the mere existence of tubercular peritonitis does not necessarily mitigate against the adoption of radical measures.

When excision is performed there are various ways of re-establishing the continuity of the canal.   End-to-end anas-tomosis possesses one serious objection, that, if obstruction has not dilated the ileum and contracted the colon, so that there is not quite such a disparity between the two divided extremi-ties, accurate and neat adjustment of the ileum to the colon is not possible.   Disparity of calibre, however, may be over-come by adopting the method employed in a case by Zahlmann (29).   After excising the cæcum for tuberculosis he divided the ileum obliquely, so as to obtain an aperture of sufficient size to unite to the colon.   The patient did well.

Another method of anastomosis is to close both extremities of the divided bowel, and then, by applying the surface of the ileum to that of the colon, establish a bi-mucous fistula, as was successfully accomplished in a case recorded by Eve (13) ; in this instance the ileum was applied to the ascending colon.

The method, however, which I am most disposed to advocate, both from practical experience and from the testimony of others, is to close the end of the colon and plant the end of the ileum into the side of the colon opposite to its mesenteric attachment, as, for instance, was done in Case XXI, and in Maitland's (21) case already referred to.   The special advantages of this method are, that disparity of calibre is of no consideration ; that on one side at least—that of the colon—there is a complete unbroken surface of peritoneum to which the ileum is attached ; that there is but little likelihood of any cicatricial narrowing of the orifice of communication ; and that as the ileum pours its contents into the side of the colon, obstruction is improbable.

There are certain details worthy of attention, which, how-ever, apply to all conditions of entero-anastomosis, and have no particular significance in connection with the operation as performed for tuberculosis.   I would, however, refer briefly to the particular method of effecting the union between the two portions of the gut, whether by end-to-end anastomosis, by lateral approximation, or by lateral implantation.   As a method of preference, and one which appeals most to a sense of safety,

stitching seems to me better than the use of any mechanical con-
trivances.   Time, I think, is certainly saved in employing Mayo
Robson's bone bobbins or Murphy's buttons ; and if that, in any
case, is a vital consideration, whatever risk is run they should
be employed.   Kammerer (30) excised nine inches of the ileum,
the cæcum, and the entire ascending colon for tubercular disease,
and planted the end of the ileum into the transverse colon with
a Murphy's button.   The patient, who was a man, aged twenty-
nine years, made a good recovery.   On the other hand, Rentier
(31), after excising the cæcum for tuberculosis, united the bowel
ends by means of a Murphy's button. Death occurred on the sixth
day after the operation. The lumen of the button, which remained
in situ, was completely blocked by fæces.   The real danger lies in
what the last case demonstrates—the clogging of the canal of the
bobbin or button by fæces.   It was similarly the cause of fatal
obstruction in a case of malignant disease in which I had em-
ployed the button for anastomotic purposes.   There is another
danger in the use of the button which occurred to me when
relieving obstruction from old tubercular adhesions.   The dis-
tended bowel was thinned rather than thickened, and in order
to save time, in a case which had already entailed a prolonged
operation, I approximated the dilated ileum to the contracted
descending colon, and effected a communication by means of a
Murphy's button.   The patient died in about four days.   At
the *post-mortem* general suppurative peritonitis was found, the
result of a perforation at the seat of the button.   It appeared
that the thin wall of the ileum, gripped by the button, had
sloughed, and so led to leakage.

  If excision is not possible or not advisable the next best
procedure is to short-circuit between the ileum and the colon.
While this alternative is desirable it is not imperative, except
under circumstances suggesting obstruction.   The anastomosis
may be effected by lateral approximation and the establish-
ment of a bi-mucous fistula, or by division of the ileum,
occlusion of the distal end, and lateral implantation of the
proximal into the colon.   Epstein (3), in his case already
referred to, adopted the former method, the union being
effected between the ileum and transverse colon ; ten months
later the child was in excellent health and had gained 22 lb.
in weight.   My own case, narrated at the conclusion of this
chapter, is also an illustration of the same method.   The

principal objection to the latter method is that, assuming the patient recovers and the disease subsequently disappears, there is left a long *cul-de-sac,* which recent experience of short-circuiting for other conditions has shown proves a troublesome receptacle for the retention and accumulation of regurgitant fæces.

The question of total exclusion of the affected part has but little to commend it. A case was published by Eiselberg (32) in which the tubercular infection extended from the ileo-cæcal valve to the middle of the transverse colon. The part was " excluded " by uniting the ileum to the colon beyond the disease, while the two ends of the excluded portion were brought out and fixed in the upper and lower angles of the wound. The patient recovered, but died from advanced disease of the lungs a few weeks later. Very little improvement seemed to have taken place in the parts operated upon. As Senn (33) points out, who quotes the case, " the immediate dangers to life are almost equivalent to the risks incident to resection, and the advantages over those of partial exclusion are not sufficient to warrant a more general recourse to the procedure."

If, then, on exposing the affected region, neither excision nor short-circuiting are possible, is there any further course open for treatment beyond simply closing up the abdominal wound ? In explanation of the favourable results which have accrued in some of these apparently otherwise hopeless cases, the mere matter of exposure of the parts, coupled with manipulation, has been considered by some of curative value. Alexis Thomson (27) holds such a view, and in support quotes a case where nothing more was done. Pearce Gould's (25) case, already alluded to, affords another instance in support of the apparent good following simple laparotomy and exposure of the region. On the other hand, not a little importance has been attached to the free dusting of the part with iodoform. In the presence of abscess-cavities these may, in addition, be stuffed with iodoform gauze. Such a method of treatment proved successful in one of my own cases ·(see Case XXIV), and in Nové-Josseraud's, already quoted ; it is a method, also, warmly advocated by Senn (33).

It is not infrequent that, after some of these operations, fistulæ form and for a time discharge fæcal matter. They

are often very persistent, and will open and close in a very aggravating manner.   However, they invariably eventually close as the disease itself disappears, and, as a rule, had better not be meddled with.

Apart from all operative measures the usual anti-tubercular constitutional treatment should be carefully carried out, for much depends upon the general resisting powers of the system, and in proportion as these are raised so is recovery expedited and completed.

CASE XXV.   *Tubercular stricture and ulceration of ileum simulating ileo-cæcal disease ; localised tubercular peritonitis ; laparotomy ; extensive matting of involved area to parietes and enlarged mesenteric glands ; ileo-ileostomy above obstruction ; cure.*

Robert C—, aged seven years, was admitted to the Victoria Infirmary in May, 1907.   Up to about six weeks prior to his admission it appeared that he had enjoyed good health, but that he then commenced to complain of general abdominal pain, which in a day or two became localised to the right iliac region.   A week later his mother noticed that his belly was swollen over this particular region.   With local applications and rest in bed these symptoms all disappeared, until three days before admission, when he again complained of pain in his back and on the right side.   He has had no vomiting, but his bowels showed a distinct tendency to be constipated, so that aperients and injections had become necessary.   His mother stated that since his first attack, six weeks ago, his appetite had been poor and he had gradually lost flesh.   His family history was good.

On admission to the Infirmary he was noticed to be somewhat pale and thin, with tongue slightly coated with fur.   The abdomen presented, generally, nothing abnormal, but by palpation a small, very slightly tender swelling was detected in the right iliac region.   There was resistance here, but it seemed possible to make out that the swelling was not fixed, and that it could be rolled slightly under the finger.   His temperature was 100° F. and his pulse 98.   He was kept under observation for about a week, during which time his temperature occasionally rose to 100° F. in the evening, but otherwise there were no marked symptoms.

Operation.—The abdomen was opened, as for appendicectomy, by a gridiron incision in the right iliac region, but the incision had to be subsequently carried forwards through the oblique muscles in order to obtain sufficient room.   Clear serous fluid at once escaped from the

peritoneal cavity. On insertion of the index finger a mass was detected intimately adherent to the anterior abdominal parietes, and tubercles were both seen and felt freely scattered over the parts immediately surrounding. A more exact examination showed that a loop of bowel, apparently of the ileum, was involved in a tubercular lesion, which embraced a matted mass of tubercular mesenteric glands. As any attempt at removal appeared unadvisable, anastomosis was effected between the two portions of the ileum above and below the implicated parts by lateral approximation. So far as it was possible to make out there were no tubercles or other lesion in any other part of the abdomen. As there had been considerable separation of adhesions it was deemed advisable to introduce some iodoform stuffing, and incompletely close the parietal wound. On the third day there were signs of the formation of a fæcal fistula; and it was some five or six weeks before this finally closed. But for this the boy continued to make steady progress, his bowels moving well and freely; his appetite was good and he put on flesh. The drainage sinus took on a tubercular action, and it was for this that he was kept under observation for four months. At the end of this period he left the Infirmary for the convalescent home apparently cured.

AUTHORS REFERRED TO.

1. CROWDER.—' Amer. Journ. of the Med. Sci.,' N.S., 119, 1900, p. 683.
2. LEDIARD.—' Lancet,' 1898, vol. ii, p. 408.
3. EPSTEIN.—' Wien. klin. Rundschau,' February 28th, 1904; also ' Brit. Med. Journ.,' 1904, vol. i, Epitome, p. 76.
4. HOFMEISTER.—' Beitr. z. klin. Chirurg.,' Bd. xvii, 1896, p. 577.
5. CONRATH.—' Brit. Med. Journ.,' 1904, vol. i, Epitome, p. 76.
6. GREY TURNER.—' Lancet,' 1905, vol. ii, p. 824.
7. A. HALL AND G. S. SIMPSON.—' Lancet,' 1905, vol. ii, p. 1320.
8. KÖNIG.—' Zeitschrift f. Chir.,' 1892, Bd. xxxiv, p. 65.
9. BENOIT.—' Gaz. des Hôpitaux,' 1898.
10. PILLIET AND THIERY.—' La Progrès Médicale,' 1894, tome xx.
11. CAUSSADE AND CHARRIER.—' Archiv Gènèrales de Médicine,' 1899, N.S., tome i, No. 4.
12. MAYO ROBSON.—' Clin. Soc. Trans. Lond.,' 1902, vol. xxxv, p. 58.
13. FRED. S. EVE.—' Med. Soc. Trans. Lond.,' 1903, vol. xxvi, p. 221.
14. LÖWENSTEIN AND KAUFMANN.—' Zeit. f. Tuberk. und Heilstatt.,' Bd. x, Heft 1, 1906; also ' Brit. Med. Journ.,' 1906, vol. i, Epitome, p. 25.
15. HERBERT FRENCH.—' Brit. Med. Journ.,' 1907, vol. i, p. 256.
16. McARTHUR.—' Annals of Surgery,' 1901, vol. xxxiv, p. 205.
17. PAGE.—' Lancet,' 1897, vol. ii, p. 10.
18. CRAWFORD RENTON.—' Lancet,' 1902, vol. ii, p. 1322.
19. CHARTERS SYMONDS.—' Clin. Soc. Trans. Lond.,' November 24th, 1899.

20. SACHS.—' Archiv Gén. de Méd.,' 1892, vol. ii, p. 561.
21. MAITLAND.—' Brit. Med. Journ.,' 1901, vol. i, p. 1138.
22. A. B. JOHNSON.—' Annals of Surgery,' 1902, vol. xxxv, p. 811.
23. ROKITANSKY.—' Trans. of the Sydenham Soc. Lond.,' 1854.
24. F. M. CAIRD.—' Trans. of the Med.-Chir. Soc. Edin.,' vol. xxiii, N.S., 1904, p. 26.
25. A. PEARCE GOULD.—' Med. Soc. Trans. Lond.,' 1903, vol. xxvi, p. 231.
26. W. J. MAYO.—' New York Med. Journ.,' 1899, vol. ii, p. 257.
27. ALEXIS THOMSON.—' Practitioner,' 1895, p. 440.
28. NOVÉ-JOSSERAUD.—' Lyon Médicale,' 1896, No. 22.
29. ZAHLMANN.—' Hospitals Tidende,' 1892, No. 36; quoted by N. Senn (33).
30. KAMMERER.—' Annals of Surgery,' 1904, vol. xxxix, p. 1010.
31. RENTIER.—' Bull. et Mém. de la Soc. der Chir.,' 1896, No. 7; quoted by N. Senn (33).
32. EISELBERG.—' Archiv f. klin. Chir.,' Band 54, Heft. 3; quoted by N. Senn (33).
33. N. SENN.—' Journ. of the Amer. Med. Assoc.,' vol. xxx, p. 1195.
34. GUINON AND PATER.—Quoted by Hartmann (35).
35. HENRI HARTMANN.—' Brit. Med. Journ.,' 1907, vol. i, p. 849.
36. CHARLES GREENE CUMSTON.—' Annals of Surgery,' 1907, vol. xlvi, p. 765.

OTHER REFERENCES.

W. GIFFORD NASH.—' Lancet,' 1907, vol. ii, p. 957.
J. NOON.—' St. Bartholomew's Hospital Reports,' 1904, p. 128.
R. ATKINSON STONEY.—' Lancet,' 1905, vol. ii, p. 287.
C. B. KEETLEY.—Ibid., 1906, vol. ii, p. 4.
F. S. KIDD.—Ibid., 1907, vol. i, p. 9.
CUMSTON AND VANDERVEER.—' Annals of Surgery,' 1902, vol. xxxv, p. 50.
W. S. MAGILL.—Ibid., 1894, vol. xx, p. 642.
FENWICK AND DODWELL.—' Lancet,' 1892, vol. ii, p. 133.

CHAPTER XI

TUBERCULOSIS OF COLON

It has usually been considered that the large intestine is peculiarly exempt from tubercular affections; and, comparatively speaking, it may still be regarded as so.   Nevertheless, practical experience in surgical work, and, more particularly, the teaching of the *post-mortem* room, go to prove that the disease is of sufficient frequency to claim some attention.   It is not proposed to deal with the subject at greater length than is necessary for a clear understanding of the disease as it affects this particular region.   For in aetiology, pathology, symptoms, diagnosis, prognosis and treatment, there is little to differentiate tuberculosis of the colon from that of the cæcum, or, in many points, from that of the small intestine.

As regards the part of the colon most frequently infected, there is no doubt that the ascending segment suffers oftenest. In the majority of instances this is simply an extension of the disease from the cæcum.   Indeed, it will be found that in by far the larger proportion of cases disease in any part of the colon is usually associated with more extensive disease in the cæcum, the explanation being that the one is secondary to the other.   If we consider how often these patients suffer from obstinate constipation, it is easy to understand how an infected cæcum can be the means of distributing infection to other more distant parts of the canal.   The two flexures, the hepatic and the splenic, are apparently somewhat predisposed to infection; a result largely accounted for by the slight obstruction which is liable to take place at these particular parts.   Apart, however, from such a direct mode of infection, there is no doubt, from the cases not unfrequently met with, where there is no involvement of the ileo-cæcal segment, that the disease may primarily commence in some part of the colon; and further, that the affected area may be the primary seat of the disease in

the system.   An example of such a condition is afforded by the
case of a child reported by Freeman (1).   The case of my own
quoted below I am also inclined to regard as one of primary
involvement of the colon.

Perhaps the part of the large intestine least frequently im-
plicated is that which joins on to the rectum, the pelvic colon.

Fig. 26.—Two tubercular ulcers of the descending colon which nearly
surround the bowel.   (London Hospital.)

It is the part farthest removed from the commonest seat of in-
fection, the cæcum.   The relative frequency with which each
part of the colon is affected is shown by some statistics pub-
lished by Fenwick and Dodwell (2).   In 883 cases of phthisis
some part of the intestine was ulcerated in 500 cases.   The
ascending colon was affected in 51·4 per cent.; the transverse
colon in 30·6 per cent.; the descending colon in 21 per cent.;
and the sigmoid in 13·5 per cent.

As to the nature of the lesion, there is little or nothing to distinguish an ulcer in the colon from an ulcer in the ileum. The two illustrations (Figs. 26 and 27) show very typical ulcers. Fig. 26 shows a portion of the descending colon with two large ulcers nearly surrounding the bowel. The specimen was removed from a child, aged four years, who had ulcers also in the ileum. Hall and Simpson (3) record a case of hypertrophic

Fɪɢ. 27.—Tubercular ulcer of the colon.   (Royal College of Surgeons.)

tubercular stricture of the ascending colon about five inches above the caput cæcum. The stricture was about an inch and a half long, and admitted the little finger only. There were no symptoms of obstruction.

The only symptom of ulceration of the colon is tenderness produced by pressure over the affected region; otherwise there is nothing in the symptoms generally to differentiate the disease from ileo-cæcal tuberculosis.

When obstruction ensues as the result of cicatrisation, the

symptoms present a certain amount of variation, dependent upon the seat of obstruction. In this, however, tubercular stricture differs in no respects from those strictures which follow from other causes. As a rule the farther down the obstruction the more chronic the symptoms and the greater the abdominal distension.

Little need be said in the matter of treatment, for the course to adopt follows on precisely similar lines to that laid down for ileo-cæcal disease, and only differs in the anatomical nature of the parts dealt with, the colon taking the place of the cæcum in all matters of anastomosis. The following case illustrates tubercular stricture of the colon, the result of healed ulceration.

CASE XXVI. *Tubercular stricture of the splenic flexure; chronic intestinal obstruction; colo-colostomy; cure.*

David S—, aged twenty-two years, was admitted to the Victoria Infirmary in November, 1900. Up to about two months ago, when his present illness commenced, he is stated to have been healthy with no trouble either with his stomach or his bowels. His first symptoms appeared to have been rumblings within his abdomen, which he both felt and heard. A fortnight later he became sick and went home, and in the evening vomited. His next symptom was pain, at first felt in the umbilical region, and later in the right iliac region. It was intermittent in intensity, and taking food seemed to aggravate it. From this period onwards his symptoms came to be intermittent attacks of pain accompanied by vomiting and constipation, so that for the latter he found it necessary to take aperients. He never noticed blood in his motions. His appetite had failed, and he had lost flesh. The family history was good, with no evidence, apparently, of tuberculosis.

On admission he was noticed to be pale and emaciated, but otherwise bright and intelligent. Tongue somewhat dry and sticky, and coated with brownish fur; his breath was offensive. Pulse 72, regular, and of good tension; temperature 99·4° F. Lungs normal.

On examination of the abdomen marked peristalsis was observed, with rumbling and gurgling; distension was most evident over the cæcum. Palpation revealed tenderness in both iliac regions on deep pressure, but nothing of the nature of a tumour could be felt. By the rectum nothing could be detected, except that it appeared very capacious. The urine was acid with a specific gravity of 1037; some albumen. The patient's only complaint was that of pain and tender-

ness in the right iliac region. The condition being considered one of chronic obstruction, the patient was operated upon on the fifth day after admission.

The abdomen was opened by a median incision. The appendix was first sought for, and being found distinctly enlarged it was removed. A further search revealed some large glands in the mesentery, markedly tubercular in appearance. The largest of these, about the size of a husked walnut, had been felt through the abdominal parietes immediately prior to opening the abdomen. The colon was found to be greatly distended, and on tracing it down it led to a puckered stricture at the splenic flexure. There were many tubercular masses of various sizes in and around the strictured gut, creating such an intimately involved condition of the parts that it was considered inadvisable to attempt removal. Portions, therefore, of the colon, proximal and distal to the stricture were applied to each other, and a bi-mucous fistula established (colo-colostomy). The patient made a good recovery, and when he left the Infirmary six weeks after his operation his general condition was excellent, and his bowels moved regularly and well.

AUTHORS REFERRED TO.

1. R. G. FREEMAN.—Quoted by W. J. Mayo, ' New York Med. Journ.,' 1899, vol. ii, p. 252.
2. W. SOLTAU FENWICK AND P. R. DODWELL.—' Lancet,' 1892, vol. ii, p. 133.
3. A. HALL AND G. S. SIMPSON.—*Ibid.*, 1905, vol. ii, p. 1320.

CHAPTER XII

TUBERCULOSIS OF THE VERMIFORM APPENDIX

As a pathological consideration tuberculosis of the appendix is unquestionably of interest, but to what extent it may be regarded important as a clinical entity is another matter. Except for the prominent place which acute and chronic inflammatory affections of the appendix have come to occupy in diseases located mostly in the right iliac fossa, it is doubtful whether such a condition as tubercular disease of that particular organ would have received any recognition apart from its more frequently involved neighbour, the cæcum. In attempting, however, to differentiate the various causes of uncomplicated appendicitis, tuberculosis must have a place as one of these causes. How frequently such a cause exists it is very difficult to say. For there is no doubt, from the description of many recorded cases so classified, that the appendix was not alone affected, and that there was just as much, if not sometimes more, reason for believing that the case was one of cæcal or ileo-cæcal tuberculosis with implication of the appendix, than that it was purely appendicular. For instance, Deaver (1), who goes the length of regarding primary tuberculosis of the appendix as " among the greatest of rarities," quotes in illustration a case in which it seems more than likely that the cæcum, and not the appendix, was the real primary seat of the disease. Mayo Robson (2), again, narrates a case of " tubercular appendicitis," but the extensive involvement of the cæcum found at the operation seems to leave it reasonably open to question whether it was not rather the cæcum than the appendix that was primarily at fault. Numerous other cases, also, might be instanced where the cæcum, being in like manner implicated, left it reasonably doubtful whether the cases were rightly recorded as true illustrations of tuberculosis of the appendix, regarded in a primary sense.

Notwithstanding, however, these somewhat conflicting evidences, it can now no longer be considered a matter of doubt that tubercular appendicitis is a disease peculiar and distinctive in itself, and worthy of being regarded from all those points of view which we are accustomed to look at disease when attacking other better known and more frequently affected organs.

ÆTIOLOGY.

There is, no doubt, some little confusion in the use of the term "primary" as applied to tubercular disease of the appendix. By some it is regarded as the only seat of the affection in the body; by others, on the other hand, it is considered as indicating disease in the appendix, independent of, and not extending from, tuberculosis of the bowel elsewhere. As employed in the first sense, there seems little doubt that, so far as actually recorded instances are concerned, it is extremely rare. Kelynack (3), in discussing this aspect of the question, remarks: "In all the cases that I have observed it was secondary, or at least associated with, tubercular affections elsewhere." Bouglé (4), who devotes considerable attention to the matter, holds to the belief that tubercular appendicitis is much commoner than is supposed, and that its assumed infrequency is due to a want of more careful examination of all cases. And in order to arrive at a true estimate of the relative frequency of the disease, every case of so-called simple appendicitis, and judged as such by the naked eye, should be submitted to a histological and bacteriological examination. As a somewhat striking and clear illustration of true primary disease Cathelin's (5) case may be instanced. In this case there was no trace of tuberculosis of the lung or of the large intestine; the cæcum and peritoneum were slightly involved, but the lesions were more recent, and, therefore, probably secondary to those in the appendix.

Regarding the subject from the standpoint of secondary infection, the result of disease elsewhere in the body, there are many instructive records of statistics showing the comparative frequency with which the appendix is attacked. Lesueur (6) found that out of 500 autopsies on patients suffering from tubercular lesions in some part of the body, 144 showed tuber-

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cular appendicitis ; and of these 91·6 per cent. were in association with cæcal tuberculosis, and in only 8·3 per cent. was the appendix alone affected.   Fenwick and Dodwell (7), after examining the records of 2000 necropsies on cases of phthisis performed at the Brompton Hospital for Consumption, found that in seventeen instances it was expressly stated that the appendix was the only portion of the intestinal tract that showed any evidence of ulceration.   The authors, however, in criticising these statistics, say that "the cæcal appendages appear to have so frequently escaped examination that they are unable to state with any degree of certainty the relative frequency with which this portion of the bowel was affected," and, further, that there is nothing definitely to show that the ulceration was tubercular and not simple.   On the whole, however, they incline to the former view.

The relation of the appendix and the cæcum to each other, in the matter of tubercular infection, leaves no doubt as to the great frequency with which the disease of the latter extends into the former.   But there are not wanting facts in support of the converse.   Palermo (8) records seven cases of tubercular disease of the cæcum consecutive to disease of the appendix, and Cathelin's (5) case, quoted above, affords another illustration.

Yet another aspect from which the subject may be regarded is that of the relative frequency of tubercular appendicitis to that of the non-tubercular forms.   Lockwood (9), whose statistics are among the most reliable, because based, in all instances, upon a careful histological examination of the parts, computes the ratio at 2 per cent. of all cases.   Hérisson (10), after a careful consideration of various statistics, gives a similar proportion—that is to say, 1 or 2 per cent. of all cases of appendicitis.   Mayo Robson (11), in reviewing 300 cases of appendicitis upon which he had operated, records five as examples of tubercular appendicitis.   These statistics come remarkably near to each other.   But it must be owned that only in the cases recorded by Lockwood is it definitely stated that a careful histological examination was carried out in each instance.   Considering, therefore, the great number of appendices that are removed for one cause or another, some further support is needed before a definite statement can be made in the matter.   If every appendix that is removed, except in such cases where

there is no doubt as to the nature of the lesion, was submitted to a careful histological and bacteriological investigation, it is possible, as suggested by Bouglé (4), that the disease would be found to be much more frequent than is at present supposed.

Before alluding to certain natural proclivities on the part of the appendix to become infected, there is the relationship which a non-tubercular affection of the organ bears to a tubercular one; that is to say, whether the one could or would predispose to the appearance of the other. Letulle (12) advances the theory that the presence of an acute microbic infection might be antagonistic to infection by the tubercle bacillus. On the other hand, it would seem more in accordance with what we are familiar with elsewhere in the case of mucous and serous surfaces, that a simple catarrhal condition of these membranes would predispose to a tubercular infection. The question is one very difficult to answer definitely. It can only be surmised, however, that considering the frequency of catarrhal conditions of the appendix and the apparently extreme rarity of primary tubercular disease of the organ, the former can hardly be regarded as a common or even likely precursor or cause of the latter.

Considering the various reasons that were given for infection of the cæcum, the appendix would seem to possess these in a still more marked degree. So favourable, indeed, are the natural conditions of the part, that one only wonders why, so far as our knowledge at present goes, it is not more frequently the seat of tubercular disease than it appears to be.

In the first place, it occupies the most dependent part of the cæcum, and is, as it has somewhat aptly been described, "a cæcum of the cæcum." Its channel is narrow, and in early life, at least, and at that period, therefore, when tubercular infection is most potent in its infective influences, it is in open communication with the cavity of the cæcum. The anatomical disposition of the organ renders it peculiarly liable to retain within its canal any fæcal matter which may pass into it from the cæcum. The weakness also of its muscular tunic, as also the frequency with which the organ is kinked or strictured, all tend to retain its foreign contents and inhibit their expulsion. Thus, should any of this fæcal matter be infected by swallowed sputum, no conditions could be considered more suitable for the onslaught of the tubercle bacillus. But still more favourable

conditions are present, for in the walls of the appendix are abundant lymphoid follicles, and, as has been shown previously in the case of the cæcum and ileum, this tissue is peculiarly prone to invasion by the infective tubercular virus. It can, therefore, be easily understood how, from purely theoretical considerations, we might readily reason out, not only the possibility, but the actual frequency with which we should expect the appendix to become the initial seat of tubercular disease. We might even extend these theoretical considerations further, and say that the existence of the so-called fæcal concretion, so frequently discovered within the canal of the appendix, is a predisposing cause. For, acting as an irritant on the mucous membrane, it produces one of those traumatic influences so potent, as we know from analogy in other parts, in the rôle of tubercular infection. If, therefore, with all this reasoning the disease is not so frequent as we should anticipate, it may be, as contended by Letulle (12), that other agencies are at work, such as the antagonistic influences of other micro-organisms which inhibit the influence of, or even destroy, the tubercle bacilli.

Coming to more practical considerations, it would appear that the disease is more frequent in males than females, and more often met with between the ages of twenty and forty years than below or above that period. Hérisson (10) cites the case of a child at the breast and one of a man, aged sixty years. The period, therefore, it will be observed, corresponds, as might be expected, with that which was given in discussing the same question in connection with disease of the cæcum; and this similarity would even go towards suggesting that it was a mere matter of accident whether the one or the other, the appendix or the cæcum, was the first to be infected.

PATHOLOGY.

The nature of the lesion depends to a considerable extent upon the mode by which the infection is brought about. Four courses are usually accepted : (1) Through the medium of the intestinal contents; (2) through the blood ; (3) through the peritoneum ; and (4) through the lymphatics. Too little is known of the last method to require more than a passing notice. It is assumed that if the meso-cæcal glands are infected

the lymphatics which pass from the appendix to these might prove the means of conveyance of the virus. That tuberculosis of the peritoneum should involve that particular part of the serous membrane which covers the appendix is only in accordance with what happens to other parts of the intestinal canal. It rarely, if ever, extends beyond the serous coat, although it

Fig. 28.—Tubercular ulceration of the vermiform appendix.   (St. Bartholomew's Hospital.)

may be the means of causing the appendix to become adherent to neighbouring structures and so produce symptoms that would be diagnosed as appendicitis. It is doubtful whether this should be regarded as strictly a form of tubercular appendicitis, inasmuch as it is only part of a general infection. That the blood may be the medium of infection is, of course, quite possible; and it is probable that by this means may be

explained those exceptional instances of the hyperplastic form
of the disease.   It is, however, by way of the intestinal canal
that we must probably look for the most frequent source of
infection.   It has already been shown by the statistics given
how often the disease of the appendix is associated with
pulmonary complications. Such complications necessarily involve
in many, if not most, cases the swallowing of bacilli-laden
sputum, and the fæces thus infected become the immediate
means of transporting the virus to the mucous lining of the
appendix.   In this last method of infection we have the best
means of explaining the nature of the lesion most frequently
met with.   The process by which the typical lesion is produced
follows in all its details that fully described in the case of the
small intestine.   The bacilli make their way into the lymph-
follicles, there excite their characteristic inflammatory changes,
ending in caseation and destruction of tissue and the formation
of the typical tubercular ulcer (see Fig. 28).   Our pathological
museums possess very few specimens of tuberculosis of the
appendix.   At Guy's Hospital there is one preparation (No. 957
in the catalogue).   Numerous tubercular ulcers are seen on the
mucous surface, and on the serous coat numerous miliary
tubercles are visible.   There is no mention as to whether the
cæcum was also involved.   In the Brompton Hospital for
Consumption there are three specimens.   One (No. 365) shows
the appendix enlarged and ulcerated from apex to base ; the
cæcum was unaffected, but the ileum was extensively ulcerated.
The two other specimens showed the appendices equally
involved in the disease of their respective cæci.   In the London
Hospital Museum is a very poor specimen showing the
appendix involved in the same area of ulceration which
embraces the cæcum.   The specimen from which Fig. 28 was
taken exists in St. Bartholomew's Hospital (No. 2035*b*).   It was
taken from a patient aged thirty-five years who had died of
chronic phthisis and lardaceous disease.   There was some
slight ulceration of the small intestine.   In the museum of the
Newcastle-on-Tyne Royal Infirmary is a specimen (No. 355/1)
which shows multiple tubercular ulceration.   It was removed
post-mortem from a man, aged twenty-two years, who had died
of phthisis.   It is a somewhat interesting clinical fact in
connection with this case that it is noted that there was
" no appendicitis."

In some instances the chronic inflammatory process seems to lead to the formation of caseous masses of variable size. As represented in Fig. 29 a solitary tumour-like structure is seen; in other cases more discrete nodules are visible here and there, while in not a few instances the mucous membrane is observed to be projected forward by what appear to be minute whitish

FIG. 29.—Solitary tubercular mass in the parietes of the vermiform appendix. (Western Infirmary, Glasgow.)

tubercles. When the appendix is attacked by the hyperplastic form of the disease it presents the same hypertrophied tumour-like condition noticed when the cæcum is similarly involved. I have met with this particular form of the disease once, but in this instance it was part of the same disease which involved the cæcum, and appeared to extend into the appendix from this viscus (see Case XXI). In the case recorded by Crowder, and narrated in full by Kelly (16), the appendix was

implicated exclusively, and formed, as shown in Fig. 30, a separate tumour-like structure.

Two other forms of tubercular disease of the appendix have been described—an atrophic form and a cystic form. These, however, may be considered pathological curiosities, and probably mere accidental sequences in the natural progress of the disease than the manifestation of special types.

SYMPTOMS.

The frequency with which tubercular disease of the appendix is associated with that of the cæcum, and the equally common co-existence of the affection with tuberculosis elsewhere in the body, renders it very difficult, if not impossible, to classify any series of symptoms that could be termed exclusively pathog-

FIG. 30.—Hyperplastic tuberculosis of the vermiform appendix. (Crowder, from Kelly.)

nomonic of tubercular appendicitis. There are, however, certain symptoms which may, at least, be considered suggestive.

In the first place, the history of the case is important, both from the family aspect and from that of the individual. In the former, tuberculosis in other members of the family tends to support the possibility of the lesion in the appendix being of that nature ; and still greater probability is lent to the suspicion if in the latter there exists, or has existed, pulmonary disease. Inasmuch as the swallowing of sputum laden with tubercle bacilli is regarded as one of the most fruitful sources of infection, we may consider a very definite history of such to increase the probability, all the more strongly, of the specific nature of the affection.

As regards general and local manifestations, diarrhœa rather than constipation is a symptom somemhat strikingly observed in many recorded cases. The initial stages of the disease may

be ushered in by the sudden appearance of acute epigastric or umbilical pain, with a subsequent settling of the same in the right iliac fossa. But when once located in this latter region it is apt to be of a more frequently recurrent nature, and sometimes even constant. When the disease has reached what might be termed the chronic stage, a resistant mass, if not an actual swelling, may be detected, somewhat painful on pressure, and of a shape which may suggest an enlarged appendix. In some cases the slow progress and chronicity of the disease is coupled with emaciation and night sweats and evening rise of temperature. On the other hand, however, it has been noted that the temperature has remained normal. These differences may possibly be explained on the existence or non-existence of mixed infection.

DIAGNOSIS.

It may at once be said that our present knowledge does not admit of a positive diagnosis being made of tubercular appendicitis. But there may exist symptoms embracing the patient's past history and his present condition which may allow of a very strong probability being entertained as to the specific nature of the disease. The difficulties are created through the precise similarity of the symptoms which may arise when the cæcum is the seat of infection and not the appendix. To differentiate between these two foci of disease is well-nigh impossible; and the real object of all our diagnostic efforts must be aimed at distinguishing between tubercular and non-tubercular affections of the region. The initial attack of acute pain occurring either in the epigastric or umbilical region, or in the right iliac fossa, presents nothing distinctive, but the chronicity of the conditions, either of the nature of pain or of swelling in the right fossa or the association of diarrhœa, and of other indications of tubercle in the patient or patient's family, may be taken to favour tuberculosis as against other infections of the appendix or cæcum. It must always be remembered that mixed infection, the association of pyogenic micro-organisms with tubercle bacilli, produces symptoms resembling those which arise when tubercular disease is not in question.

Some authors draw attention to the possible confusing effects of enteric ulceration of the appendix. The difficulty, however,

is more likely to arise in distinguishing between it and non-tubercular affections of the appendix than in cases of supposed tubercular disease.

Some assistance may, in doubtful cases, be derived from testing the reactionary effects of tuberculin injections and also from the determination of the opsonic index. As, however, these methods of diagnosis have already been fully described in connection with the discussion of ileo-cæcal tuberculosis and tubercular ulceration of the small intestine, I shall be content with referring the reader to those particular sections (see pages 74 and 134). As showing how nearly possible it may be, under certain tolerably clear conditions, to form a fairly correct diagnosis of tubercular appendicitis, the following case recorded by Bouglé (13) is worthy of being related. The case was one of the hyperplastic type of the disease. The patient was aged twenty-four years. He had been under treatment for phthisis. When the disease was supposed to be checked and the pulmonary lesion cicatrised he was seized with pain in the right iliac fossa. The pain was not very acute, and of a more prolonged character than is usually met with in the commoner forms of appendicitis. Further, there was continual diarrhœa, also a symptom not common in ordinary circumstances. A swelling (" empâtement ") of slow formation, but quite distinct, appeared, unaccompanied with any rise of temperature and without causing any peritoneal disturbance. The coincidence of pulmonary tubercle with the particular character of the appendicular symptoms led the author to the opinion that the case was one of a tubercular appendix. When the abdomen was opened the cæcum was found somewhat congested, but the real lesion was seated lower down. A whitish mass somewhat lardaceous-like in appearance, and " du volume de trois doigts," was found attached to the cæcum with its apex adherent to the abdominal parietes. When removed it was discovered to be the appendix. A careful histological examination of the organ was made and its identity as a tubercular lesion proved by detecting the presence of the tubercle bacillus.

PROGNOSIS.

To repeat what has been said under the heading of ileo-cæcal tuberculosis would be to directly indicate the course

which similar disease of the appendix might be expected to pursue; with, however, possibly this exception, that inasmuch as the appendix is completely surrounded with peritoneum, and often occupies a position of comparative freedom within the abdominal cavity, extension, in some shape or form, may be expected to be more frequent and more serious in its results. That tubercular peritonitis may be a result of primary infection of the appendix is possible, but probably is one of the least frequent of the many causes which may give rise to this particular generalised appearance of the disease.   Perforation, causing a general peritonitis, is considered by Hawkins (14) as a rare occurrence; Fitz (15), however, records eight cases in which perforation of a tubercular appendix took place.   More common may be considered the formation of chronic abscess, which usually either bursts into the bowel or finds its way to the surface of the body, leaving a fistula behind it.

In some of the recorded cases where there has also existed extensive ileo-cæcal disease, the appendix has been found completely destroyed.   It is from this fact that the authors of some of these cases have regarded them as illustrations of primary disease of the appendix, considering that the destruction of the organ must indicate an earlier involvement of it than of the cæcum.

It is not unreasonable to assume that a tubercular appendix may predispose to other forms of typical appendicitis.   The chronic inflammatory process involved in the tubercular infection may cause the appendix to become adherent to neighbouring parts; and thus displaced or disorganised, it may conduce to those other inflammatory affections which we are accustomed to associate with appendices so hampered in whatever normal functions—if any—they may be supposed to possess.

TREATMENT.

But few remarks are needed upon a course of treatment which briefly resolves itself into removal of the appendix.   An appendix, however, which is involved in disease of the cæcum is simply part of a process, the whole of which needs removal.   To exclusively remove an appendix under these latter conditions is to leave an infected stump which will be certain to cause trouble sooner or later.

AUTHORS REFERRED TO.

1. DEAVER.—'A Treatise on Appendicitis,' second edition, p. 90.
2. MAYO ROBSON.—'Lancet,' 1902, vol. ii, p. 852.
3. KELYNACK.—'Pathology of the Vermiform Appendix,' 1893, p. 121.
4. J. BOUGLÉ.—'Arch. Gén. des Méd.,' 1903, tome i, p. 263.
5. CATHELIN.—'Presse Med.,' Juillet 26, 1898.
6. LESUEUR.—'Thèse de Paris,' 1903 ; quoted by Hérisson (10).
7. W. SOLTAU FENWICK & P. R. DODWELL.—'Lancet,' 1892, vol. ii, p. 133.
8. NATALE PALERMO.—'Riforma Medica,' Ne. 41, 42, 1904; quoted by Leconte, 'Les Malades des Voies Digestives,' 1905.
9. C. B. LOCKWOOD.—'Appendicitis, its Pathology and Surgery,' second edition, p. 160.
10. HÉRISSON.—'Gazette des Hôpitaux,' 1906, No. 44, p. 519.
11. MAYO ROBSON.—'Lancet,' 1902, vol. i, p. 163.
12. LETULLE.—'Revue de la Tuberculose,' 1905, 2e. serie, tome ii.
13. J. BOUGLÉ.—'Bull. et Mem. de la Soc. Anat. de Paris,' 1903, 6e. serie, tome v, p. 92.
14. H. P. HAWKINS.—'Diseases of the Vermiform Appendix,' 1895, p. 56.
15. FITZ.—'Amer. Journ. of the Med. Sci.,' October, 1886.
16. HOWARD A. KELLY.—'The Vermiform Appendix and its Diseases,' 1905, p. 338.

CHAPTER XIII

TUBERCULOSIS OF THE MESENTERIC GLANDS AND THE LUMBAR LYMPHATIC GLANDS (RETRO-PERITONEAL)

In considering the mesenteric glands, it will prove somewhat helpful if we regard them in the light of lymphatic glands which play the same part in relation to the intestinal canal that similar glands exercise in relation to other parts of the alimentary tract. For instance, many of the causes which give rise to tuberculosis of the cervical lymphatic glands are those which lead to infection of the mesenteric, and the various pathological changes which occur in the former are equally those which may be expected to exist in the latter. Viewed in this relationship the picture becomes a tolerably clear one, and we should not be likely to go very far wrong if, even in the absence of any significant local manifestations, we ventured to reason from the one to the other. Indeed, even in the matter of treatment there is a growing consensus of opinion that just as we have come to regard excision of the cervical glands as, in very many cases, the proper course to pursue, so removal of the infected mesenteric glands under equally suitable circumstances should be adopted.

The term "tabes mesenterica," which is still sometimes employed to signify a supposed special abdominal condition due to pronounced tubercular disease of the mesenteric glands, should be abolished; for abdominal surgery has revealed the fact that the mesenteric glands present every degree of enlargement and infection, and represent, more frequently than not, a purely pathological sequence in the *rôle* of intestinal tuberculosis. In advanced conditions also there may be, and, indeed, usually is, infection of the peritoneum, so that "tubercular peritonitis" would be the more correct expression to use.

ÆTIOLOGY.

There is every reason to believe that a perfectly healthy lymphatic gland will resist the onslaught of the tubercle bacillus. But whether it can actually destroy the bacillus or inhibit its passage through the gland is very doubtful. Fibiger and Ipsen (1), who examined with extreme care the mesenteric glands of 102 children dying from various causes, found, as evidenced by guinea-pig inoculation, the presence of tubercular bacilli in a gland, which otherwise presented neither patho-logical nor microscopical changes. Experimental researches on animals go to prove also that tubercle bacilli may make their way through the mesenteric glands while these remain apparently intact. Thus Calmette and Guérin (2) succeeded in producing pulmonary tuberculosis, without lesion of the gastro-intestinal mucosa or of the mesenteric glands, by intro-ducing suspensions of tubercle bacilli into the rumex of adult goats. Should, however, a gland be impaired in its action, it would seem—in common with what we know to be the case in most other organs and tissues—that infection by tubercle bacilli may take place.   From this point of view we have the probable explanation of the frequency with which the glands are involved in children as compared with adults.   An exami-nation into the various periods of life at which the glands are found most frequently infected shows, according to some statistics published by Sims Woodhead (3), that the maximum infection is attained between the years of one and five. Thus, in 100 instances of disease of the glands there were four cases in the first year of life; 33 between one and two and a half years; 29 between three and five years; 12 between six and seven and a half years; 13 between eight and ten years; and 9 between eleven and fifteen years. Carr (4) found out of one series of 28 cases, 16 under one year; and of another series of 65 cases, 37 between one and five years. Occurring, therefore, with such frequency at the early period of life, when intestinal disorders are so common, it seems reasonable to suppose that the glands are already in a condition of impairment from other exciting causes; and if we take into consideration also the fact that at this period the mother's milk is being substituted for that of the cow, there is introduced an additional cause for

the possible greater frequency of infection at this particular early epoch.

There is ample evidence to show that the glands may be primarily affected. But it is equally clear that the mesenteric glands do not escape infection if there is intestinal ulceration. Guthrie (5), who took particular note of this aspect of the question, observed in investigating the condition of the glands in twenty-seven cases of death from tuberculosis in children where there was intestinal ulceration, that in every instance the glands were involved. As regards primary infection,

FIG. 31.—Lymphatic vessels distended with tubercular material passing
from the surface of the intestine towards a group of enlarged mesenteric
glands. (St. Thomas's Hospital.)

Sims Woodhead (6) found it to exist in 14 per cent. of all cases of tuberculosis in children. Biedert (7) met with it in forty cases out of 1346 necropsies of tubercular children. Carr (4) had five cases out of 120, and Grawitz (8) four cases out of 1104 necropsies.

In further support of the possibility of primary infection are some of the experiments performed upon animals. Cornil and Babes (9) have shown by experiments that bacilli introduced into the intestine of the guinea-pig can pass through the epithelial covering without the epithelium being injured, and are diffused in the tissue of the mucous membrane ; they enter very rapidly

by the lymphatic channels into the mesenteric glands. Orth (10) also, by feeding rabbits with bacilli, found that out of nine in which tuberculosis was produced, two showed no lesion of the bowel. Although the bowel may, or may not, show evidences of lesion, there may be very distinct appearances in the course of the lymphatics leading from the bowel to the glands. This is well shown in a specimen which is much more beautiful and distinct as such, than as represented by the photograph from which Fig. 31 is taken. It is in the Pathological Museum of St. Thomas's Hospital (No. 1061), and, as described in the catalogue, represents a series of lymphatic vessels distended with tubercular matter passing from the surface of the intestine towards a group of slightly enlarged mesenteric glands.   ·

There are some differences to be noted in the way in which the glands are affected at certain periods of life. Brünig (11) argues " that the simultaneous infection of sets of lymphatic glands is characteristic of the tuberculosis of children as distinguished from that of adults, in whom but a single infective focus is commonly found." Calmette and Quérin (2) observe that " in adult animals the defensive action of the lymphatic glands is much less active ; the bacilli are more frequently carried along with the leucocytes which englobe them into the main lymph stream, and thence by the pulmonary artery into the lung."

PATHOLOGY.

The changes which the mesenteric glands undergo as the result of tubercular infection in no way differ from those met with in lymphatic glands similarly involved in other parts of the body. When once the bacilli get a hold of the gland they soon effect changes characteristic of their presence. These changes, however, are extremely variable, and probably depend as much in some instances upon want of resistance of the gland tissue, as in other cases upon the virulence of the microbic attack. In some instances—and this applies mostly to children— several glands are involved, as shown in the specimen from which Fig. 32 was taken. The preparation is in the museum of St. Thomas's Hospital (No. 1147). It was taken from a child in which the mesenteric glands formed a compact lobulated mass about 2½ inches in diameter. The different glands were

separable by dissection, and in all opaque yellow masses of caseous tubercle were concerned.   It is further noted with regard to this specimen that the disease appeared purely limited to the glands, as no disease was recognisable in any portion of the intestine.   In the museum of St. Mary's Hospital is another specimen of caseous tubercular mesenteric glands from a child aged three years (No. 308), in which, as in the preceding specimen, there was no sign of disease elsewhere, so that it was

FIG. 32.—Compact mass of tubercular mesenteric glands from a child.
(St. Thomas's Hospital.)

regarded as an illustration of primary disease of the glands. In some cases the glands present a diffuse rather than a con- glomerate appearance, as shown in a preparation in the museum of St. Bartholomew's Hospital (No. 2012c).   In this specimen (Fig. 33) there are glands enlarged quite close up to the bowel wall, and some are so slightly involved that they produce only a faintly perceptible elevation of the overlying peritoneum.

As is so frequently illustrated in the case of the cervical glands, there can be no doubt that in many instances the mesen-

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teric glands are but temporarily involved.   They enlarge and after a time regain their normal condition, illustrating that Nature has been able to combat the onslaught, and the glands to resume their normal function.   This, however, is only surmise, but reasonable enough from what we know to be the case elsewhere in the system.   When the pathological process leads to caseation one of two results will ensue, either the glands slowly assume the form of a chronic abscess, or by absorption shrink up and become converted into hard concretory masses.   Fig. 34,

Fig. 33.—Tubercular mesenteric glands diffusely distributed.   (St. Bartholomew's Hospital.)

which is taken from a preparation in the museum of the Charing Cross Hospital (No. 1023A), represents such a condition.

Although a gland may be partially or completely converted into a chronic abscess, there is still the possibility of its becoming converted into a mass of the nature of a solid concretion. Whether this stage, when reached in whatever way, may be considered final it is hardly possible to say.   The probabilities, reasoning from analogy, are in favour of permanent inertness. But there are not wanting evidences that from some inexplicable cause a quiescent tubercular focus, even though hard and almost stony in consistence, may be excited into renewed

activity.   In these exceptional instances it may be that there is fresh infection, or that some bacilli, dormant for the time being, are awakened into life and development.   The point is of some practical interest as bearing on the question of treatment and the advisability of operative removal.

Should by any chance the tubercular process in a gland be not kept strictly within the limits of its own texture, infection of the general peritoneal cavity may take place.   In many instances this infection can be traced to the rupture of a gland, but it is probable that the more frequent course is by simple extension from the surface.   The cases usually regarded as tabes mesenterica were generally of this more extended nature, that is to say, obvious enlargement of the glands coupled with tubercular peritonitis.   The following case may be cited in illustration :

CASE XXVII. *Rupture of a tubercular mesenteric gland*; *tubercular peritonitis ; adhesion of bowel to umbilicus ; fæcal fistula ; increasing asthenia ; death.*

Joseph S—, aged two years, was admitted to the Victoria Infirmary in May, 1904. About six weeks previous to admission it was first noticed that the child's abdomen was swollen, and about a month later a reddish lump appeared in the region of the umbilicus; this burst and a quantity of fæcal matter escaped. The mother stated that the child had never been very strong, but it had never had any serious illness.

On admission the child looked very ill, with a pulse of 140, but with a normal temperature. It was extremely emaciated, pale in complexion and typically rickety, with rosary on chest, enlarged bones at wrist, etc. Examination of the abdomen revealed no distension nor tenderness, but some enlarged glands could be detected in the upper part. At the umbilicus a small fistulous opening was seen about a quarter of an inch in diameter; through this all the contents of the bowel seemed to be evacuated. The motions were loose and of a very fœtid odour. The child was too ill to entertain the question of operation. He seemed gradually to get worse, and died on the eighth day after admission.

At the *post-mortem* the organs of the thorax were found healthy. On opening the abdomen loops of intestine were found matted together with the serous coat of the bowel studded with tubercles.   The mesenteric and abdominal glands were found enlarged, very soft, and

caseous on section. The largest gland was about the size of a walnut; it had ruptured and apparently been the cause of the tubercular peritonitis. On opening the bowel, the walls of which were extremely thin, two small ulcers were found in the lower part of the ileum. The fæcal fistula was formed by the adhesion of a loop of small intestine to the parietal wall, and the giving way of the structures at that place.

When the inflammatory process reaches the periphery of the gland it is liable to become adherent to some neighbouring peritoneal surface, either visceral or parietal. Adhesions so formed become sometimes stretched and result in the production of membranous expansions or bands, by which coils of intestine may be obstructed. The following case is an illustration of an adhesion contracted between a tubercular mesenteric gland and the parietes :

CASE XXVIII. *Band passing between a tubercular mesenteric gland and the abdominal parietes; acute intestinal obstruction; laparotomy and division of band ; death.*

Jennie McD—, aged one and a half years, was admitted to the Victoria Infirmary in September, 1905. She was in a practically moribund condition, and the history given was that four days previously she had been seized with sickness and vomiting, and abdominal pain of a not very marked character. On admission the child looked very ill, and was absolutely placid. The abdomen was slightly distended, but there was no tenderness, and nothing could be felt either through the parietes or *per rectum*. It was stated that there had been no movement of the bowels since the commencement of the illness ; and that the vomit prior to admission was black and " evil smelling." The temperature was 98° F. and the pulse uncountable.

The abdomen was opened, and immediately distended and intensely congested coils of small intestine presented. The colon and cæcum were found quite collapsed ; and on searching for the cause of obstruction a cicatricial band was discovered passing from a tubercular mesenteric gland to the anterior abdominal wall, and compressing and completely obstructing a coil of the ileum. This was divided and the abdomen closed. The child only survived eighteen hours.

This case is simply recorded for the pathological aspect it presents. From the point of view of treatment it was, of course, from the outset a hopeless one. There are, however, several

cases recorded of a precisely similar character where, under more favourable clinical circumstances, operation has been performed with complete success.

With regard to the question of mixed infection it is reasonable to suppose that, like, for instance, the cervical glands, the mesenteric glands may sometimes be the seat of a more or less acute inflammatory process associated with the tubercular involvement.   It is probably uncommon, and may be so from

Fig. 34.—Tubercular mesenteric glands which have become converted into hard caseating masses.   (Charing Cross Hospital.)

the explanation given by Corner (12) that "the abdominal lymphatic glands which drain the intestinal tract become tolerant and inured to the products of bacterial action, so that they are very rarely excited to the pitch of suppuration." When, however, such infection does take place it is liable to be fraught with very serious results.   If adhesions do not take place to limit the pus and allow it to escape either by rupture into the bowel or by a slow process of extension to the body surface, it may, by pouring its contents into the general peritoneal cavity, set up a general suppurative peritonitis.

SYMPTOMS.

Except when the glands form sufficiently large masses to become tangible it is doubtful whether there are any symptoms in themselves suggestive of tubercular infection. A slight degree of enlargement is consistent with perfect health; and when there are symptoms such as wasting, diarrhœa, night sweats, increase of temperature, etc., they are probably the result of other tubercular lesions than those exclusively dependent upon the gland involvement. For it must be remembered that while primary disease of the glands is possible, enlargement is very often the result of tubercular intestinal ulceration; and even if that be not present there may exist other foci, more particularly in the lungs, from which bacilli may be carried through the bowel wall to the glands. The distension of the abdomen and the presence of fluid in the abdominal cavity may alike co-exist with enlargement of the glands. But these conditions, again, are more symptomatic of tubercular peritonitis than of simple uncomplicated gland infection. There are no symptoms whereby it would be possible to say that in any given case of acute intestinal obstruction the cause was due to a band originating in inflamed tubercular glands. The history of tuberculosis in the family, or earlier indications of the disease in the individual, might admit of a suspicion as to the cause; but here, again, there are other tubercular lesions than those exclusively associated with the mesenteric glands, which give rise to the formation of similar bands.

DIAGNOSIS.

The question of diagnosis is easier in the case of children than in that of adults. For while in the latter there are many conditions which may give rise to tumours, simple and multiple, within the abdomen, in the former there are but few; indeed, it may be said that hard movable lumps in the belly of a child which remain constant under all conditions are almost certain to be tubercular mesenteric glands. Fæcal masses may, for the time, mislead; but besides the characteristic indentation of which they may admit, a free evacuation of the bowels may alter their position, or cause their discharge and consequent

disappearance.   Branson (13), as the result of the investigation
of forty cases of primary abdominal tuberculosis in childhood at
the East London Hospital for Children, says : " It may almost
be laid down as a rule that hard movable tumours in the
belly of a child which are not fæcal are caseous mesenteric
glands."

If in children any rigidity, voluntary or involuntary, of the
parietes prevent free palpation, an anæsthetic should be
administered ; and often the investigation is greatly aided by
bimanual examination.   The younger the patient the more
complete is rendered possible the manipulation of the contents
of the abdominal cavity ; with the forefinger of one hand forced
well up the rectum and the fingers of the other applied to the
abdominal surface it is possible, with comparative ease, to
detect any enlargement of the mesenteric glands.   When the
examination can be undertaken under such favourable circum-
stances it is as well, perhaps, to remember that the mesenteric
glands can be enlarged from chronic non-tubercular gastro-
enteritis.   But these glands, as revealed more frequently at
post-mortem, are usually softer than those infected with tubercle.
A solitary tumour in the abdomen of a child should be regarded
from the point of view of possibly being due to some other
cause than that of tuberculosis of the mesenteric glands.   Thus
a chronic intussusception may simulate in its physical characters
enlarged glands.   There is, however, in the former usually some
history of obstruction manifested by constipation, pain, and
periods of more or less abdominal distension.

As already stated, there are no really specific symptoms
which point to tuberculosis of the mesenteric glands ; when
there are symptoms markedly in evidence they indicate
tubercular lesions other than those solely connected with the
glands.

In the adult it is practically impossible to be certain that a
lump within the abdomen is a tubercular mesenteric gland ; and
not only so, it is, more frequently than not, impossible to detect
infected glands at all.   From the fact that the ileo-cæcal
segment is the part of the bowel in the adult most frequently
ulcerated, the mesenteric glands in this region are similarly most
frequently involved.   But the enlargement of the bowel itself
and the thickening of the surrounding parts usually mask any
increase in size of the glands.

In the case of a man, aged forty-one years, recorded by Corner (12), a skiagraph gave a shadow of a caseous and partially calcareous gland. When removed at operation the gland was about the size of a large walnut. As already indicated, it is not so usual in the adult to get multiple enlarged glands as in children; on the other hand, a solitary gland may assume much larger proportions than in the case of the latter.

<div align="center">PROGNOSIS.</div>

There is no reason for assuming that the result may not be good when a general improvement is taking place in the patient's health, for there is no better indication of the system overcoming the tubercular invasion than when there is a good appetite and a steady increase in body weight. In itself, tuberculosis of the mesenteric glands is rarely, if ever, a direct cause of death; the sole mischief lies in the secondary complications which may arise. Given, therefore, the obvious existence of enlarged glands in a patient whose health is failing, and in whom there are other evidences of local or constitutional disturbance, one may conjure up many possibilities that may happen, although it is quite without the pale of human skill to forecast such. Pathological considerations have already indicated some of the lesions which may ensue, while there are others more or less accidental in their occurrence.

Calmette (14), as the result of some experiments, found that pigments ingested by adult animals found their way at once to the lungs. Such pigment, it may be assumed, must have passed by the usual lymphatic channels through the mesenteric glands, thus proving that an infection of these glands may, in themselves, be a means of supplying material which will similarly infect the lungs. But Sims Woodhead (15), by careful investigation, was able to prove the correctness of what otherwise might be deemed only a theoretical surmise. He traced tuberculosis from a caseous or old calcareous mesenteric gland through the chain of retro-peritoneal glands up through the diaphragm to the post-mediastinal and bronchial glands, and so on to the lung. The production of phthisis must be regarded, therefore, as one possible consequence of mesenteric gland infection. Another similar possibility is the causation of tubercular meningitis. This particular phase of tuberculosis is not an infrequent sequel

to disease of the bronchial glands, and inasmuch as these glands, as shown above, are also liable to infection through the mesenteric, one must regard the brain and its membranes as tissues not without the range of secondary infection through the mesenteric.   It is possible for enlarged glands to cause pressure, and one rather striking example of such a result is recorded by Lenoble and Attila (16).   The patient suffered from jaundice which, shortly before death, became extreme.   At the *post-mortem* " the lower parts of the lungs were found full of recent miliary tubercles; the upper parts were riddled with cavities and adherent to the pleura.   The liver was enlarged, softened, and bile-stained, weighing four pounds.   The gall-bladder was distended, and the cystic duct compressed by a large gland; a string of smaller diseased glands lay along the cystic and common ducts; they were strongly adherent and completely obstructed the ducts by pressure."

Some of the commoner complications are connected with the advance of the disease in the glands, either reaching the surface and causing crops of tubercles to appear which may lead to dissemination; or forming chronic abscesses which may burst into the bowel, into the general peritoneal cavity, causing a general tubercular peritonitis; or, by becoming adherent to the parietal peritoneum, burst externally, forming one of the kinds of external fistulæ.   Why the umbilicus should, as a rule, be selected, it is not possible to say, except that the tissues are thinner there, and, therefore, more easily give way.

The following case is an illustration of infection of the peritoneum through the rupture of a caseous gland, in addition to those already narrated under the heading of pathology of the disease.   For permission to publish the case I am indebted to my colleague Dr. Ebenezer Duncan, under whose care the patient was originally admitted.

CASE XXIX. *Rupture of a caseous tubercular mesenteric gland; acute abdominal miliary tuberculosis; death.*

John K—, aged twenty-one years, was admitted to the Victoria Infirmary in April, 1906.   Up to the commencement of his illness, seven weeks before admission, he appeared to have had good health, but at that time he began to complain of pain in his left side, a cough with "tough" expectoration, and of swelling of his abdomen.   The cough seemed to improve, but the abdomen increased

in size. On admission to the Infirmary the abdomen was found very protuberant, dull all over on percussion, with a distinct wave obtained from side to side. A Southey's tube was inserted, and blood-stained fluid was drawn off to the extent of 24 oz. This was repeated on the two following days, when an additional 36 oz. were removed. His temperature reached in the evening 102° F. and 103° F. The man got rapidly worse, and died on the fourth day after admission.

A *post-mortem* was made by the Infirmary pathologist, Dr. John Anderson. On opening the abdomen a large quantity of deeply blood-stained fluid was found; the coils of the small intestine were distended, and the serous coat deeply congested. The mesentery presented a similar appearance. Studded over the parietal peritoneum and on the serous surface of the bowel were numerous miliary tubercles. The omentum was much thickened, rolled up and congested. The mesenteric glands were considerably enlarged, and one about the size of a walnut had ruptured. On section they all presented evidence of caseation. With the exception of a few tubercular ulcers in the region of the ileo-cæcal valve no other tubercular lesion was discovered in the abdominal organs. Permission was only granted for the examination of the abdomen.

That tubercular glands may prove a fruitful source of cicatricial bands within the abdomen there is no doubt. It is by no means uncommon to find a band passing from a tubercular gland in the mesentery either to the visceral or to the parietal peritoneum, and thus proving the source of acute intestinal obstruction by strangulating a loop of gut.

Again, the danger of a mesenteric gland undergoing acute inflammation is always a possibility, though fortunately rare. When an abscess is so formed it may burst into the peritoneal cavity, and be the cause of acute suppurative general peritonitis. Such a case is reported by Guthrie (5) where rupture of a mesenteric glandular abscess led to death from a generalised peritonitis. And there is my own case (Case XX) where the result of attempting to deal with a gland so infected led to death from suppurative peritonitis.

TREATMENT.

Comparatively recent advances in the technique of abdominal surgery have caused the question of operation upon tubercular

mesenteric glands to enter the field of practical treatment. The success also which so frequently attends the complete extirpation of the cervical glands has further contributed to encourage efforts in this particular direction. But abdominal surgery has done something more, for it has come to the aid of the pathologist in demonstrating how many and serious are the complications which may arise out of tubercular infection of the mesenteric glands.

It is as well, however, to look first at the conservative aspect of the question. From analogy to glands situated elsewhere, and more particularly to those in the cervical region, there is ample evidence to show that in many cases tubercular glands, after reaching a certain stage, may completely subside, and in a sense disappear. And so far as we are able to understand the process it points to a natural resistance on the part of the tissues and a power to overcome the onslaught and devastating influences of the tubercle bacillus. This being the case there is no reason to suppose that a similar subsidence and disappearance should not take place in the case of the mesenteric glands. Before, therefore, the question of operation is entertained, every effort should be put forth to increase the normal vital resisting powers of the body. We may know, as a rule, that our efforts are succeeding by not only the gradual diminution of the glandular mass, but by what is always so favourably significant in tubercular disease anywhere in the body—the general constitutional improvement.

Another prior consideration is the possible existence of any local cause for the gland infection. It would obviously be unreasonable to deal with a consequence while the cause remains in action. If, therefore, there is reason to suppose that tubercular ulceration of the intestine exists, or that the patient has phthisis, any attempt to remove the mesenteric glands would be manifestly a mistake. Indeed, it would not be going far wrong to say that excision should only be entertained when the infection can be regarded as primary, or where, at least, no indication of active tubercular disease exists in the intestinal or pulmonary tract.

In considering the advisability of operation there is more than one aspect from which it must be regarded. There are certain comparatively simple cases where the removal of one or more glands may be considered the proper course to pursue,

as, for instance, in those cases where a gland, by contracting adhesions, has led to the formation of bands and the consequent strangulation of a loop of intestine.   In operating upon these cases for the relief of obstruction it may add but very slightly to the operation to remove the gland and so rid the patient of any possibility of the subsequent formation of adhesions from the same source.

A second class comprises cases in which it is somewhat more difficult to decide what course to pursue.   They occur mostly among adult patients and present usually great enlargement of one or two glands, which form a tumour-like mass within the abdomen.   In these cases operations are often undertaken for purely exploratory purposes, and it is not until the part is actually exposed that the true nature of the tumour is revealed. Glands which have themselves, or in conjunction with each other, formed local masses of considerable size, are likely to con-tract very intimate adhesions to the overlying peritoneum, so that simple enucleation is impossible, and removal could not be undertaken without taking away also a considerable part of the mesentery.   The injury such an operation would be likely to inflict on portions of the bowel by interfering with the blood supply renders any attempt at excision inadvisable.   There are, however, not a few cases recorded where it would seem as if the simple exploration, without any further treatment, had been followed by good result.   Such success attended an attempt in the following case :

CASE XXX. *Enlarged tubercular mesenteric glands ; exploratory laparotomy ; irremovable ; subsequent complete disappearance.*

Susan B—, aged eighteen years, was admitted to the Victoria Infirmary in October, 1897.   She had been previously in the Infirmary for tubercular cervical glands, which were excised.   Two days prior to admission on the present occasion she was seized with pain in the abdomen in the region of the umbilicus.   It only lasted a short time, and was unaccompanied with vomiting.   A dose of castor oil effected a movement of the bowels.

On admission there was nothing observable about the abdomen, except on palpation, there was distinct evidence of thickening situated directly beneath the umbilicus and to its left side.   At this place, also, there was some tenderness on pressure.   During the few days while under observation, previous to operation, some variation seemed

to take place in the amount of prominence of what had come definitely to appear as a swelling in the abdomen. The temperature varied, often reaching 100° F. in the evening, and sometimes as much as 102° F. The patient was anæsthetised for the sake of examination. It was then found that there existed a tumour somewhat freely movable in the epigastric and left hypochondriac regions, and presenting, to some extent, the shape of a kidney. Another small tumour was felt slightly lower down, but it was not so movable.

A few days later the abdomen was opened, when the tumour, felt externally, was found to be situated between the layers of the mesentery, fluctuant, and non-adherent to the surrounding parts, but too diffusely connected with the mesentery to admit of removal. The small tumour, also felt externally, was situated lower down and behind the peritoneum. The conclusion arrived at was that the case was one of tubercular mesenteric glands.

She remained under observation for six weeks, for the greater part of which time the temperature still fluctuated between normal and 102° F., there being a rise almost every evening. Before she left, however, it showed distinct signs of remaining normal. When dismissed from the Infirmary there was still a considerable tender abdominal swelling. It was subsequently ascertained that the tumour finally entirely disappeared, and that the girl was restored to perfect health.

In further illustration of the natural disappearance of tubercular glands after operation, a case recorded by Halstead (17) may be referred to. When the abdomen was opened a large number of enlarged mesenteric glands were found, so many that it was not thought wise to remove them; some were as large as a hen's egg. The abdomen was closed, and the patient recovered after about three months. Three years after she was operated upon for post-operative hernia. The opportunity was taken to inspect the abdominal cavity, when it was found that the only evidences of the earlier trouble existed in the form of a small calcareous body representing a gland. Of equal interest is a similar case recorded by McArthur (18). In this case, that of a child, when the abdomen was opened, among other tubercular lesions was the presence of glandular masses in the mesentery as large as a fist. Twelve months later the abdomen was reopened for the relief of hypertrophic tuberculosis in the ileo-cæcal region. It was then found that the lymphatic masses had almost disappeared. Thus, then, we may receive

some encouragement from the fact that, where removal is not possible, our exploratory efforts may have some beneficial effects in the way of helping towards the future absorption and disappearance of large glandular masses.   And still further, such knowledge should prevent us attempting excision where any endeavour would be unduly difficult, if not actually fraught with danger.

In adults, more than in children, there is the possibility of mixed infection of the glands, and this to the extent sometimes of forming abscesses of a more or less subacute character.   To deal with these by incision or extirpation, partial or complete, is a matter of no little anxiety ; for unless drainage can be very efficiently carried out to the exclusion of the general peritoneal cavity a suppurative peritonitis may be set up.   This accident occurred in a case operated upon by Czerny (21), partial extirpation and drainage leading to death from septic peritonitis.   And Case XX of my own series affords a similar illustration.

If, in children, all reasonable efforts by constitutional measures have failed to produce any appreciable diminution in a mass of tubercular mesenteric glands, and it seems likely that some, at least, of the symptoms from which the child suffers are due to the enlarged glands, the question of excision should be raised.   In recent years quite successful attempts have been made in this direction.   McArthur (18), in relating the case above quoted, alludes to another, where, in operating upon a child, aged nine years, innumerable enlarged tubercular mesenteric glands were found ; these the operator continued to remove until the child was almost in a state of collapse.   The child recovered, and when last heard of was in perfect health.

Rotch (23) relates the case of a child who had been failing in appetite, losing in weight and strength, and having a heightened temperature.   A tubercular mesenteric gland could be detected by physical examination.   This was removed, and the child, when heard of about six years later, had had no return of the disease.

Corner (19), at a meeting of the Medical Society of London, referred to the fact that he had operated upon five cases of tubercular mesenteric glands ; two of these are narrated at some length, and in view of the interest which attaches to the subject I shall briefly describe them.   The first case was that of a boy,

aged six years, who presented a well-defined somewhat rounded mass in the region of the cæcum, about the size of a cricket ball; the upper limit reached to the level of the umbilicus, the outer to the mid-Poupart line, the lower to the level of the anterior superior iliac spine, and the inner to the linea alba. The swelling was definitely movable, particularly inwards. There was some tenderness on palpation, and small nodulations were to be felt on its anterior surface.   An incision was made over the swelling, and after stripping off the omentum, which was adherent to its anterior surface, a large rounded mass was found lying in the mesentery, adherent to the cæcum, the ascending colon, and partly to the transverse colon.   An incision was made into the mass, and caseous pus escaped; part of the mass was scraped away and part excised.   The cavity left was closed with two rows of silk sutures after thorough irrigation with saline solution.   The abdominal wound was closed.   The wound healed by first intention, and the boy made a perfect recovery.

In the second case, that of a boy, aged twelve years, there had been a marked previous history of tubercular enteritis or ulceration.   On examination of the abdomen a movable tumour of the size of an adult kidney was present in the left loin and epigastrium.   On opening the abdomen caseous tubercular glands in the mesentery were found to form a large tumour which extended into the left hypochondrium and loin.   The peritoneal cavity was packed off, and the mesentery incised on both sides, the glands shelled out and curetted.   The abscesses had burrowed extensively.   Gauze drains were inserted in each side of the mesentery, and the abdomen was partially closed. The wound healed well, and the boy rapidly improved in health and gained in weight.

In commenting upon these cases Corner (19) observes: "From the point of view of advising operation it is most important that a tumour, the result of tuberculous peritonitis and one of tuberculous mesenteric glands, the infection being from the intestine, perhaps from a tuberculous enteritis, should be distinguished."

If further arguments were needed in favour of the probable advisability of excising tubercular glands—and this must be taken to imply mesenteric as well as other glands—they are to be found in the fact that virulent tubercle bacilli frequently lie latent in glands, which have even become calcareous.

Rubinowitsch (20) investigated four such cases of apparently quiescent calcified glands. Although the microscope could detect no micro-organism, guinea-pigs and rabbits, when subcutaneously injected with these glands, became extensively infected.

Reasoning from what we know of the course sometimes pursued in a wound after the removal of tubercular glands in the neck, how, for want of proper drainage, some tension, collection, and inflammation are apt to follow, a word of caution will not be out of place in considering the technique of excision of mesenteric glands. It may yet be some time before excision comes to occupy the position of an established practice, and it will only be in a case here and there that the treatment will, in the meantime, be carried out. If, then, we are to be encouraged in such a radical procedure, it will only be by the most careful attention to detail, so as to avoid the possible infection of the peritoneal cavity, either by the contents of the glands or by the lacerated lymphatics which course from the bowel to them.

Tuberculosis of the Retro-peritoneal Lymphatic Glands.

Coursing along the front and sides of the iliac arteries and the aorta are numerous lymphatic glands. These glands receive lymph from the descending, iliac, and pelvic segments of the colon : from the rectum, the pelvic viscera, and the kidneys ; they also drain the deeper tissues of the abdominal parietes. They are placed beneath or behind the peritoneum, and for that reason are collectively termed retro-peritoneal.

On first thoughts it may be wondered what part these glands play in the *rôle* of abdominal tuberculosis. As a clinical fact, however, it is no mean one, as will be presently shown.

The anatomical facts given above will at once suggest how easily these glands can become infected when a tubercular lesion involves any one of the viscera from which they receive their lymph ; and not only so, for it is reasonable to assume, from the analogy of enlarged glands elsewhere, that infection may be brought about through these viscera simply as agents of access without themselves being diseased.

There is no need to repeat the various pathological phases through which these glands may pass. Suffice it to say that they may sometimes form masses which appear as abdominal

tumours, or they may break down, and, by ulceration into the peritoneal cavity, lead to tubercular peritonitis or to a general suppurative peritonitis. Indeed, in regard to the various secondary changes which may ensue upon infection of these glands there is little need, either pathologically or clinically, to attempt to distinguish between them and similarly affected mesenteric glands.

As illustrating one of the gravest sequelæ to disease of these glands, a case given by Etches (22) may be quoted. A girl, aged seven years, had been in good health up to the time she was seized with acute abdominal pain. She died on the morning of the fifth day. At the *post-mortem* there was suppurative peritonitis due to the rupture of a lumbar gland. The following case also will serve to indicate sufficiently some of the symptoms to which tubercular enlargement of these glands may give rise, and the difficulties involved in arriving at a correct diagnosis. The case was first seen by my colleague, Dr. John Anderson, who advised sending the child into hospital ; to him and to my resident assistant, Dr. McNeill, I am indebted for the following notes of the case :

CASE XXXI. *Tubercular caseation and suppuration of the lumbar lymphatic glands forming an abdominal tumour; sudden acute umbilical pain ; laparotomy ; glands incised, scraped, and stuffed with iodoform gauze ; cure.*

Christina C—, aged ten years, was admitted into the Victoria Infirmary on Sunday morning, May 26th, 1907, at 12 a.m. Until the commencement of her illness she had had good health. There was an early history of scarlet fever and whooping-cough ; but she had never suffered from diarrhœa nor from any gastro-intestinal disorder. No history of kidney trouble. No tubercular lesions of the lower extremities. Her parents were quite healthy, and there was no tubercular history in the family.

Her present illness commenced on Thursday morning, the 23rd, at 4 a.m., *i. e.* three days before her admission ; she was then awakened up with a sudden severe pain around the umbilicus, but more marked on the right side. Her abdomen was poulticed, and this relieved her somewhat. She gradually improved in the course of the day. There was slight pain all Friday until 4 p.m., when it completely disappeared, and she was allowed to rise from her bed. At night, however, the pain came on again, but not severely. She was up on

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Saturday morning, having very slight pain, but about 3 p.m. she was again seized with a sharp attack of umbilical pain similar to that experienced at the onset of her illness. Since then she had never been free from pain. She vomited slightly on Thursday morning, and again on Friday afternoon after some tea and dry biscuits which she had taken. Her bowels moved regularly previous to onset of illness, and also on Thursday, Friday, and Saturday; but on the afternoon of the last day another movement took place, when only a slight amount of fæcal matter was ejected, and some mucus, untainted with blood, was observed. It was shortly after this that the child was seen by Dr. Anderson, who, on examining the abdomen, discovered a large tumour situated on the right side stretching from above the umbilicus towards the right iliac fossa. A large enema was ordered, and when he visited the patient later in the day the tumour was found somewhat smaller and the child had passed flatus. Regarding the case as one possibly of incomplete obstruction due to intussusception, Dr. Anderson ordered the child to be sent to the Infirmary.

On admission to the Infirmary some few hours later, at 12 a.m., the child looked fairly well. She appeared well nourished, and of good colour. She complained of slight pain in the abdomen around the umbilicus and towards the right side. Her tongue was covered with a brownish-white fur, but moist. Her temperature was 99·4° F., and pulse 100, of good tension. On examining the abdomen no distension was observable, nor tenderness, except on deep pressure, when a somewhat hard immovable mass, about the size of a hen's egg, was detected on the outer border of the right rectus on a level with the umbilicus. It could be defined laterally, and at its lower margin. In my absence my colleague, Mr. Macrae, saw the case for me, and deemed it expedient to operate.

The abdomen was opened by an incision two inches long to the right of the middle line, over the situation of the tumour. The intestine presented, but appeared quite normal. On further examination it was found that the mass felt externally was situated behind the peritoneum, and consisted of a collection of enlarged and softened lymphatic glands. An incision into these showed some to be caseating and others suppurating. After scraping away some of the contents the cavities left were touched with pure carbolic acid and stuffed with iodoform gauze.

The child suffered very little discomfort from the operation, and eventually made a complete recovery.

It is difficult to explain the symptoms in the light of what the operation revealed. For on the one side was an appa-

rently normal condition of the intestine, while on the other, a mass of enlarged lumbar glands insufficient in size to cause obstruction.   There is still the possibility that an intussusception existed, which the large injection may have reduced.   On the other hand, again, the pain which lingered seemed to suggest some association of the symptom with the only gross lesion discoverable.

As regards the infection of the glands the case seems on a par with those cases of cervical enlargement where no lesion or focus is detectable as a primary source of infection.   The antecedent history of the child was carefully gone into, and nothing could be ascertained suggestive of possible infection at some earlier period; so that one is forced to the conclusion that, either through the medium of the kidneys, the pelvic viscera, or the lower large bowel, bacilli had made their way by means of the lymphatics to the lumbar glands.

AUTHORS REFERRED TO.

1. FIBIGER AND IPSEN.—' Berl. klin. Wochenschrift,' June 11th, 1906.
2. CALMETTE AND GUÉRIN.—' Ann. de l'Inst. Pasteur,' May, 1906.
3. SIMS WOODHEAD.—' Lancet,' 1888, vol. ii, p. 51.
4. WALTER CARR.—Ibid., 1894, vol. i, p. 1177.
5. LEONARD C. GUTHRIE. — Ibid., 1899, vol. i, p. 286.
6. SIMS WOODHEAD.—' Brit. Med. Journal,' 1898, vol. ii, p. 918.
7. BIEDERT.—' Deut. med. Wochenschrift,' 1883, p. 794.
8. GRAWITZ.—Ibid., 1901, p. 711.
9. CORNIL AND BABES.—' Les Bactéries,' vol. ii, p. 184.
10. ORTH.—Quoted by Crowder, ' American Journ. of the Med. Sciences,' N. S., 119, 1900, p. 687.
11. H. BRÜNIG.—' Beit., z. Klinik d. Tuberk.,' Bd. iii, Heft 4, 1905.
12. EDRED M. CORNER.—' Lancet,' 1905, vol. ii, p. 1825.
13. W. P. S. BRANSON.—' Med.-Chir. Trans.,' Lond., 1905, p. 342.
14. CALMETTE.—Quoted by McWeeney, ' Brit. Med. Journ.,' 1906, vol. i, p. 623
15. SIMS WOODHEAD.—' Lancet,' 1894, vol. ii, p. 957.
16. LENOBLE AND ATTILA.—' Bull. et Mem. de la Soc. Anat. de Paris,' November, 1905; also ' Brit. Med. Journ.,' Epitome, June 23rd, 1906.
17. A. E. HALSTEAD.—' Annals of Surgery,' 1906, vol. xliii, p. 799.
18. L. L. McARTHUR.—Ibid., 1906, vol. xliii, p. 799.
19. EDRED M. CORNER.—' Med. Soc. Trans.,' Lond., 1906, vol. xxix, p. 399.
20. LYDIA RUBINOWITSCH.—' Berl. klin. Woch.,' 1907, No. 2, p. 35.
21. CZERNY.—' Bruns' Beitrage f. klin. Chir.,' 1890, Bd. vi, Heft 1.
22. W. R. ETCHES.—' Brit. Med. Journ.,' 1902, vol. i, p. 711.
23. T. M. ROTCH.—' Journ. of the American Med. Assoc.,' 1903, vol. xl, p. 70.

CHAPTER XIV

TUBERCULOSIS OF THE LIVER

FEW as are the references to tuberculosis of the liver in English text-books, there are not wanting evidences to show that involvement of this organ in tubercular disease is by no means uncommon. The subject, however, presents features more of pathological than clinical interest, but even in this latter aspect some very striking instances have been recorded where hepatic tuberculosis has led to definite symptoms.

ÆTIOLOGY.

Infection of the liver may practically always be regarded as secondary to disease elsewhere; in other words, tubercle is invariably found in other parts of the body and in the majority of instances under such conditions as render it certain that the hepatic lesion is part of a generalised process.

The disease is commoner in children than in adults, for the very good reason, probably, that the source from which the liver receives its virus—the intestine, is more often the seat of the disease. According to Holt (1) in general tuberculosis of childhood miliary tubercles are found in the liver, both on its surface and in its substance, in about two thirds of the cases. Guthrie (2) found that out of seventy-seven cases of children dying from tuberculosis in the Children's Hospital, Paddington Green, during a period of eight years, there were seven in which tubercular nodules existed in the liver, advanced in two, slight in five.

As to the mode of infection of the liver several sources are possible. The bacilli may reach the organ by way of the blood-stream, the bile-ducts, or the lymphatics. The last method may be eliminated because of the flow of the contents of these ducts being from the tissues of the organ to its periphery. The same

reason practically holds good for the bile-ducts, for they are conductors of the secretion from the viscus. However, it must be remembered that experimental inoculation of the common bile-duct has led to tuberculosis of the biliary canals (Sergent [3]), so that while infection by this means is improbable it is at least possible. On the other hand both the hepatic artery and the portal vein carry blood into the ultimate tissues of the organ and by their means, therefore, is infection most likely to take place. Of the two vessels it would seem as if the portal vein with its final ramifications proved, if not the more frequent cause, at least the principal source for the production of the grosser lesions; for, as will be described later, the caseous cavities which form in the substance of the liver are most frequently found associated with the portal radicles. The association of the portal system with tubercular ulceration of the bowel renders it clear how easily bacilli from these foci of infection can be carried to the liver. And even without ulceration we have still to remember that bacilli having their original source, say, in a phthisical lung, may make their way through the intestinal walls without causing or needing the previous existence of any lesion. The infection which takes place by means of the hepatic arterial blood is probably of a general systemic nature, and involves the liver in a process of general miliary tuberculosis. There is one other source of infection, of which it may be said, however, we know very little, that is by means of some toxic influence directly or indirectly exercised by the bacilli. As will be pointed out presently the liver may undergo cirrhotic changes, in which no bacilli are found in the organ, and yet the condition must be considered tubercular.

PATHOLOGY.

Regarded from the naked-eye point of view, four types of tubercular disease of the liver may be considered: (1) miliary, (2) caseous masses, (3) cavities or abscesses, (4) cirrhosis. The commonest of these is the first. The miliary tubercle is seen in its typical aspect as a minute grey translucent object projecting on the surface either of the exterior or on sections of the hepatic substance. They are sprinkled throughout the organ in variable numbers, and when very free in distribution lead to considerable enlargement of the liver. The illustration

(Fig. 35) was taken from a specimen in the Museum of St. Thomas's Hospital (No. 1313). It represents a portion of liver, the peritoneum on the upper surface of which has been reflected. To the under side of the peritoneum there are attached numerous miliary tubercles which have been torn away from the superficial part of the liver, where their situation is marked by corresponding pits. Similar tubercles were visible in the recent state throughout the hepatic tissue. The specimen was from a case of general tuberculosis. This particular type of the disease is, as illustrated in the specimen just described, invariably part of a generalised systemic infection in which miliary tubercles are abundantly found in other organs and tissues throughout the body. It is thus probable that infection is brought about by the blood conveyed in the ramifications of the hepatic artery. McWeeney (4), in carefully examining sections of a liver observed tubercles in a very early stage of development, when they consisted of only a few epithelioid and lymphoid nuclei. It was his opinion "that many of the tubercles began by proliferation of the nuclei of intra-lobular capillary endothelium." The subject of miliary tuberculosis of the liver has been very exhaustively treated by Arnold (5), who tabulates fifty cases, and especially deals with the effect of the tubercular infection upon new formation (gallengangneubildung) in connection with the bile-ducts.

The presence of caseating masses in the liver denotes, as it does in other organs and tissues, a more chronic process. These masses may be found under considerable variations, both as to size and seat. Some interesting specimens illustrative of this type of the disease are to be found in various pathological museums. Thus at St. Bartholomew's Hospital there is a specimen (No. 2196A), of gross tubercular disease of the liver capsule : large flat caseous nodules project from the surface of the liver, which are adherent to the under surface of the diaphragm. There were no tubercles in the liver substance. The specimen was taken from a boy, aged five years. Several yellow tubercles were found in the brain, and in all the viscera except the lungs. At the Royal College of Surgeons there is a particularly interesting specimen (No. 2754A), from the fact that one mass formed a distinct tumour. The specimen is a section of the left lobe of the liver which has undergone amyloid degeneration. The cut surface shows several deposits of

caseous material, the largest of which is 2 inches in its longest diameter and projects prominently from the superior surface of the organ. The specimen was taken from a lad who had
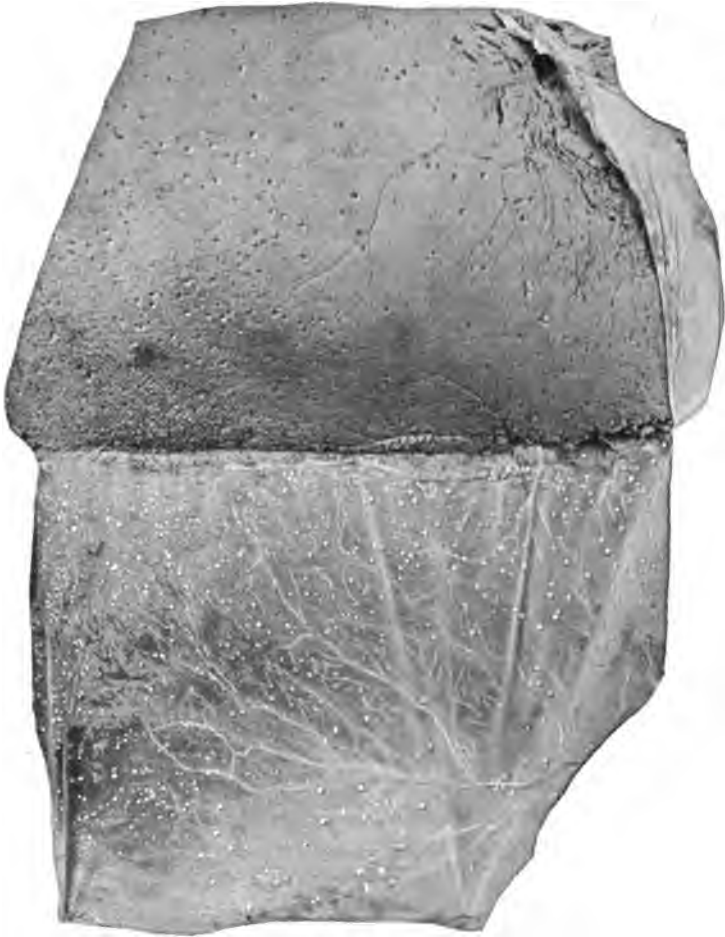

FIG. 35.—The peritoneum peeled off from the upper surface of the liver to show miliary tubercles. (St. Thomas's Hospital.)

previously suffered from symptoms of tubercular disease of the genito-urinary organs. Among some recorded cases may be mentioned two described by Simmonds (6). Both were examples of localised tuberculosis. In one there was extensive destruction of liver tissue by tubercular tumours varying in size from

that of a pea to that of a goose's egg. Moore (7) records the case of a man, aged forty-three years, in whose liver a large solitary nodule was found *post mortem*. There was a similar lesion in the spleen, and the aortic lymphatic glands were infected. This patient had also a typical carcinomatous stenosis of the pylorus. Rome (8) published a case where he successfully excised a tubercular mass which formed a tumour in the lower right lobe of the liver. This interesting case I intend to allude to more fully when discussing the subject of treatment. Orth (9) has described two cases, in one of which a caseous mass about the size of a walnut was seated deep in the right lobe ; in the other the mass measured 7 cm. in each direction, and extended upwards into the substance of the liver from the transverse fissure. It appeared entirely free from the portal vessels and the bile-ducts.

Hardly separable from the above type of the disease is that which is represented by the existence in the substance of the organ of tubercular cavities and abscesses. There is little doubt that caseation is in the majority of instances the precursor of an abscess. Whether such a thing as a cavity actually exists in the liver is doubtful. For, assuming that there exists a space filled with *débris*, immediately such a space is exposed by section its contents would fall out, and a cavity be left. But a space so formed could hardly be considered to represent any peculiar pre-existing lesion in the liver. But whether this be a correct interpretation or not, it would seem to be regarded by many that such cavities do exist, for one of the best papers on the subject is by Fletcher (10) headed " Tubercular Cavities of the Liver." In this paper the author alludes to the frequency with which the disease is discussed by foreign writers as compared with the scanty references to be found in this country. If, however, the literature is meagre, the pathological museums afford quite a number of instructive examples. The specimen from which Fig. 36 is taken is in the museum of King's College Hospital (No. 1071). It is the right lobe of the liver with a large solitary tubercular abscess. In the museum of Guy's Hospital there is a specimen (No. 1332) of a portion of the left lobe of the liver, the greater part of which is occupied by caseous material. In some parts softening has occurred with the production of abscesses which are separated from each other by fibrous trabeculæ. There was

also chronic hepatitis. The specimen was removed *post-mortem* from a man, aged thirty-three years; tubercular lesions were also found in the lungs, mesenteric glands, the left kidney and the prostate. At St. George's Hospital there is a specimen (No. 181B) of "tubercular cavities" in the liver of a child, aged two years, which died of general tuberculosis. In the museum of the Royal College of Surgeons in Edinburgh there is a

FIG. 36.—Right lobe of the liver with solitary tubercular abscess. (King's College.)

specimen (No. 38.84) showing numerous abscesses in the liver. The description of this specimen as given in the catalogue is : " In the recent condition the spaces now emptied were filled with purulent matter, and between them there were points of deposit of black material. The patient died of pulmonary tuberculosis, with extensive excavation of the lungs." The tubercular nature of the abscesses was confirmed by microscopical examination. As regards literature upon the subject, the 'Transactions of the Pathological Society of London' record three separate

contributions. One of these is by Wethered (11). The case described was that of a man, aged twenty-one years. " While in the hospital his temperature was persistently high, he complained of no pain, his cough was very slight and expectoration scanty. The liver dulness reached from just below the right nipple to three fingers' breadths below the costal margin. There was some tenderness; râles were heard over both lungs. The patient gradually sank from asthenia, after an illness of five months. After death the liver was found to weigh 64 ounces. It was firmly adherent to the diaphragm and surrounding parts. The capsule was much thickened, and the surface studded with small white granules, the largest of which was about the size of a pea. On slicing the organ it was found to contain similar nodules; the smaller of these were solid, but the larger ones soft in the centre and stained a light green. Some of these caseous abscesses were as large as a chestnut; they had thick uneven walls, and were filled with semi-fluid caseous *débris*, coloured a deep green. The bile-ducts were patent, but no communication between them and the cavities could be made out. Sections exhibited a typical tubercular structure, and tubercle bacilli were found in them. The second case is recorded by Hector Mackenzie (12). It was that of a man, aged fifty years. He had been in ill-health for about ten weeks. His chief symptoms were gradual emaciation and loss of strength, shortness of breath, pain in the right side of the chest, and perspirations. Tenderness was felt over the region of the liver, the edge of which was felt about an inch below the ribs. He had all the physical signs of phthisis. The temperature did not rise above 100° F. On examination of the liver after death the right lobe was found intimately adherent to the surrounding parts; occupying the lower part was a globular mass about the size of a large orange; the remainder of the surface was studded with a number of yellow prominences varying in size from a threepenny-piece to a shilling. " On making sections of the diseased portion of the liver it was found that the masses seen on the surface were quite as numerous in the interior. The large tumour contained soft pultaceous matter of a purplish colour, this colour being evidently due to the presence of altered blood. The cavity left after the removal of this material was one which was separated from the surface in its lower half only by the thickened capsule, a layer of tough

connective tissue about a quarter of an inch thick, which posteriorly had become calcareous. In the upper half the liver substance itself formed the cavity-wall, but it was very irregular, reminding one of the reticulated aspect given to the wall of the cardiac ventricle by the columnæ carnæ. The small yellow bodies consisted of caseous material surrounded by walls of connective tissue. The caseous material readily escaped from the cut surface, leaving the appearance of cavities." The tubercular nature of the lesions was confirmed by microscopical examination.

The third case in the 'Transactions' is reported by Fletcher, (10) whose paper has already been referred to. In this particular instance the liver was pervaded with " numerous cavities, each about the size of a large pea. They were enclosed by a thick white capsule and filled with bile-stained *débris*. . . . No communication could be made out at the *post-mortem* between the cavities and the bile-ducts." The liver was also studded with miliary tubercles both on its surface and in its substance. Mayo Robson (13) published a case in which he successfully operated upon a large tubercular abscess of the liver. This case I propose to quote in full later.

As already indicated the mode of production of these caseating masses and abscesses is probably through the medium of the portal circulation ; and when it is remembered that in a large proportion of the cases there has previously existed, or is present at the time, tubercular ulceration of the intestine, this method of infection is hardly to be wondered at. The first stage in the formation of these gross lesions appears to be, according to the investigations of Sabourin (14), Kotlar (15), and Sergent (3), the primary formation in the portal space of tubercular foci. These, as they increase, often by the conglomeration of neighbouring nodules, result in masses, variable both in form and size. When breaking down they may burst into the biliary canals, and so lead indirectly to a cholangitis, which might as much be regarded as of the ordinary catarrhal type as specifically tubercular. The possibility of a primary cholangitis set up by direct infection of the ducts, while not denied as possible is considered by many as improbable. Fletcher, (10) in his paper, to which I am indebted for many references, holds such a view, but mentions the fact also that Claude and Gilbert (16), by the experimental inoculation with tubercular

material of the gall-ducts of animals, had, like Sergent (3) and
Sabourin (14) before them, produced tubercular cholangitis.

The macroscopical characters of the abscesses as shown by the
various specimens and the descriptions given of others, represent
them as frequently possessing very irregular-shaped lining
walls, often fringed and flocculent in appearance. The outer
boundary, however, is often formed of dense fibrous tissue.
Their contents are frequently described as pultaceous in con-
sistency, and in some instances are semi-fluid. The changes
are, however, mostly of the character met with in other parts
of the body where yellow tubercular masses break down.
There is one peculiarity which is frequently noted, and that is
that the contents may be coloured greenish or purplish, the
result probably of changes in extravasated bile or blood.
Another rather striking fact is the rarity with which caseation
passes on to calcification. In only one instance is it noted—in
the case recorded by Mackenzie. Mixed infection would also
seem to be a comparatively rare occurrence. In Mayo Robson's
(13) case, narrated below, " pus " is described as existing within
the cavity, and the patient's symptoms were rather suggestive
of some acute inflammatory mischief. In the specimen in King's
College Hospital Museum, the size and general appearances of
the cavity seem almost to suggest the possible co-existence of
pyogenic organisms with the tubercle bacilli (see Fig. 36).

The fourth type of the disease—cirrhosis—is by far the
rarest. Comparatively little has been written upon the subject,
and in searching through the various pathological museums I
was unable to find any example of it. Moore (7), under the
title of " Tubercular Hepatitis," showed a specimen of a
rabbit's liver at the Manchester Pathological Society. The
animal had been inoculated twelve months previously with a
few highly virulent tubercle bacilli. " The interstitial changes
consisted in an increased formation of fibro-cellular tissue,
monolobular in distribution, which showed no tendency to
tubercle formation. Psorosperms were absent. The lungs were
the seat of extensive tuberculosis."

Spolverini (25) reports two cases occurring in children, aged
six years. The liver in one case was somewhat nodulated,
and there was glycosuria and urobilinuria. Under anti-tuber-
culous treatment the child steadily improved, and the liver went
down to its normal size. In the second case the child died of

acute miliary tuberculosis. At the *post-mortem* tuberculous granulations were found in the new connective tissue growth, developed within the liver itself, thus proving the tuberculous character of the cirrhosis.

Vincenzo (17) has reported a case and discussed the subject generally. According to the views of this author the disease appears to manifest itself in two forms : (1) "In cases of generalised tuberculosis, where the tubercles are very small and occupy the portal spaces or the hepatic lobules, the liver is fatty and may exhibit early connective-tissue neo-formation around the lobules. (2) A hepatic cirrhosis . . . without any tuberculous localisation in the liver. In these cases the liver is hypertrophic, intensely yellow, with smooth surface and rounded hard edge." In dealing with the subject clinically three types are described: (1) "The cirrhosis is acute or chronic, setting in before or in the course of the pulmonary disease. The patients complain of digestive troubles, exhibit vascular changes in the skin, suffer from myalgia, sub-icterus, peri-malleolar œdema, enlarged liver and spleen, and occasional ascites or epistaxis; urine red and loaded with urates, rapid wasting and cachexia, and finally nervous symptoms ending in coma. (2) No complaint of hepatic symptoms, but on examination the liver is found enlarged and sometimes painful; no ascites; diarrhœa is frequent. . . . (3) No signs or symptoms of hepatic trouble during life, but *post-mortem* one finds marked hepatic changes." Some of Arnold's (5) cases would seem to come under the same category. For further consideration upon this particular form of tuberculosis of the liver, I must refer the reader to Rolleston's work on 'Diseases of the Liver' (page 345) where the subject is discussed at some length.

Why in some cases the nature of the affection should be of one type and why in others of another it is not possible to say; the most difficult to explain is the cirrhotic condition, where it is often impossible to detect the presence of tubercle bacilli. For this reason largely it is considered possible that the hepatic changes are not the direct result of the actual presence of bacilli within the liver substance, but of some toxic influence indirectly effected through their agency.

Symptoms.

Little can be said regarding symptoms which may be con-
sidered in any sense distinctive of tuberculosis of the liver, for
it has to be remembered that involvement of the viscus is
usually, if not always, secondary to disease elsewhere ; and that
such symptoms as do become manifest are as likely as not to
be attributable to other affected regions.   The liver may give
physical signs of enlargement, both general and local.   When
local an actual tumour may present in the right hypochondriac
region ; under such circumstances both tenderness and pain
may be present.   In a case recorded by Rolleston (22) caseous
masses about the size of filbert nuts were felt during life pro-
jecting from the surface of the liver ; and in another related
by Anderson (23), a mass the size of a Tangerine orange was
felt in the left lobe of the liver.   Jaundice appears to be a
very uncommon symptom.   Fletcher (10) observes that in none
of the cases he found recorded was it stated to be present.
Mayo Robson (13), however, in his case given below, states
" that there had been a slight tendency to jaundice during the
four months preceding admission," and in the only case recorded
by Murchison (18) " jaundice of moderate intensity of skin and
conjunctivæ " had existed for several months.   In this case
there was general miliary tuberculosis.   The liver was very
large and weighed 77 ounces, and on microscopical examination
the enlargement of the organ was found to be due to numerous
miliary tubercles scattered through the glandular tissue between
the lobules.   Fagge (19) speaks of having seen the disease
associated with jaundice, as also Fränkel (20).   It is possible for
obstructive jaundice to be produced by the pressure of enlarged
tubercular glands situated in the hilum upon the hepatic ducts,
as in a case recorded by Kester (21).   The presence of jaundice
is probably largely an accident in the disease, and depends upon
the setting up of catarrh of the bile-passages by the rupture
into them of some of the caseating foci in the portal canals.
Rolleston (22) gives as a possible reason why jaundice is not
met with, " that the lymphatic vessels which should carry the
bile from the obstructed ducts are themselves compressed, and
are unable to convey the bile into the general circulation."
A rise of temperature is observed in some cases, and when

this is accompanied with localised swelling and tenderness it is not improbable that a certain amount of mixed infection complicates the process.

The following case was reported to the Clinical Society of London by Mayo Robson (13), and both for its intrinsic interest as an illustration of a comparatively rare disease, and for the success of the treatment adopted, I think it worth narrating in full.

CASE XXXII. *Tubercular abscess of the liver; incision and drainage; cure.*

G. R—, aged thirty-one years, a miner, was admitted to the Royal Infirmary (Leeds) on October 17th, 1892, with the history of having been perfectly well up to twelve months before, when he commenced work in a damp mine, and immediately began to suffer from intermittent attacks of pain in the right knee and in the back. He was able to follow his occupation up to March 28th, 1902, when at 4.30 in the morning, while walking to his work, he felt a sharp pain in the epigastric region, which gradually increased in severity up to 12 o'clock, at that time becoming so severe as to necessitate his ceasing work. The pain was intensely agonising, causing him to roll about on the floor with the body doubled up. There was no accompanying vomiting or jaundice. There had been no recurrence of the intense pain, but a dull aching had been constantly present, entirely preventing him working.

Three months prior to admission he noticed a lump at the seat of the pain; this had steadily increased in size. There had been a slight tendency to jaundice during the four months prior to admission, and epistaxis had occurred once or twice a week during the same period. His general health had failed, and he had lost half a stone in weight since June. No cough was present, but there were frequent night-sweats.

When admitted under the care of Dr. Churton the patient complained of a dull aching pain in the epigastrium, also high up between the shoulders, as well as in the left shoulder and over the spine of the right scapula. To the right of the middle line in the upper epigastric region there was a smooth rounded tumour the size of an orange, apparently connected with the liver. Nothing abnormal was discovered in any of the other organs. . . . A vertical incision was made, two inches long, over the swelling just below the right costal margin. The liver was found adherent to the parietes and the abscess cavity was opened as soon as the latter was cut through. A large quantity

of pus and caseous matter was removed with a lithotomy scoop, and the space having been well washed out iodoform was rubbed into its walls, a drainage tube inserted, and the upper part of the wound closed. The stitches were removed a fortnight later, the upper part of the wound being firmly healed, and the tube two days later, a very small amount of discharge being present at each dressing.

A small sinus persisted for a time, from which a few drops of pus were discharged daily, but the patient's general health improved rapidly and he was discharged on December 28th. When seen in June, 1903, he was in good health, the fistula having healed, leaving a healthy scar.

The report of the pathologist states that the material removed was shown by microscopical examination to be tubercular.

TREATMENT.

In a subject of which it may be said so little is practically known, it seems almost as if the discussion of treatment was unnecessary. Nevertheless, surgery has in more than one instance demonstrated the possibility, under certain conditions, of affording relief, and, indeed, of effecting a cure. But it might almost be said that where surgery has successfully intervened it has been more by good fortune than by any preconceived intention.

In discussing the three types of cirrhosis clinically distinguished by Vincenzo (17), this author speaks of the good effects resulting from " rest in bed and suitable diet " where the liver is enlarged, but where otherwise there are no hepatic symptoms.

That a localised abscess, when discovered, can be successfully treated by incision and drainage is sufficiently demonstrated by Mayo Robson's (13) case given above.

Tubercular masses, also, can be successfully excised from the liver, as is well shown by the following case reported by Rome (8). The symptoms were more dependent upon co-existent conditions than upon the presence of the tubercular mass, although this was indirectly the cause of the intestinal adhesions.

CASE XXXIII. *Tubercular mass in the lower right lobe of the liver; excision; cure.*

Mrs. G—, aged forty-two years, had never been ill, but had been bilious all her life. About the middle of August, 1902, she was

suddenly taken with a severe pain in the right lumbar region, lasting about twenty-four hours. Since then her side had been painful. She had experienced a difficulty in breathing, which difficulty increased until the breathing became very shallow on that side. . . . She could never sleep or rest on that side. When seen three months later she was found supporting the right side, with her hand placed over the sore spot. When walking she would bend somewhat to the right and stoop forward. . . . Abdominal palpation elicited an enlargement at a point midway between the cartilage of the tenth rib and the crest of the ilium ; it was sensitive to palpation.

On December 5th she was operated upon. An incision was made over the site of the tumour parallel to the outer fibres of the rectus muscle. On examining the liver it was found that 2½ inches of intestine were adherent to it. After freeing the bowel a tumour was found in the lower right lobe of the liver. The surface of the liver at this part was firmly adherent to the parietal peritoneum. After freeing these adhesions it was apparent that the section in which the tumour was situated could be removed in the shape of a wedge or a triangle. Heavy catgut sutures were introduced, beginning at the apex of the triangle, mentally mapped out, and passed through the thickness of the lobe; the needle was reinserted, and brought out opposite the first free end and left untied. Sutures were introduced in this manner half an inch apart and half an inch from the margin of the triangle. After inserting a sufficient number of sutures, the wedge containing the growth was cut away with scissors, and the cut surfaces of the liver immediately brought together and the sutures tied. Approximating the surfaces in this way promptly checked the hæmorrhage. The size of the tumour removed was that of a goose's egg. The abdominal incision was closed without drainage. The patient made a good recovery ; the difficulty in breathing disappeared. The specimen examined microscopically demonstrated its tubercular character.

TUBERCULOSIS OF THE GALL-BLADDER.

The rarity of tubercular infection of the gall-bladder appears to be such that the subject deserves little more than a passing notice. Lancereaux (24), as quoted by Rolleston, has described a case of tuberculosis of the common bile duct, gall bladder, and cystic duct in a woman, aged thirty-two years, which he regarded as directly due to infection from the duodenum. Holmes (25) quotes Sergent as having encountered cases of gall bladder

tuberculosis, and that in nearly all the cases there was a generalised infection.

AUTHORS REFERRED TO.

1. HOLT.—' Diseases of Infancy and Childhood,' 1897, p. 1031.
2. LEONARD G. GUTHRIE.—'Lancet,' 1899, vol. i, p. 286.
3. SERGENT.—'Compt. rend. Soc. de Biol.,' 1895, pp. 336 and 351; also 'Thèse de Paris,' 1895.
4. McWEENEY.—'Lancet,' 1900, vol. i, p. 939.
5. JULIUS ARNOLD.—' Virchow's Archiv,' 1880, vol. lxxxii, p. 377.
6. M. SIMMONDS.—'Centralbl. f. Path.,' 1898, Nos. 21, 22.
7. F. C. MOORE.—' Lancet,' 1899, vol. i, p. 378.
8. ROBERT R. ROME.—' Annals of Surgery,' 1904, vol. xxxix, p. 98.
9. J. ORTH.—' Virchow's Archiv,' 1876, vol. lxvi, p. 113.
10. H. MORLEY FLETCHER.—' Trans. Path. Soc. Lond.,' 1899, vol. l, p. 160.
11. F. WETHERED.—Ibid., 1889, vol. xl, p. 139.
12. HECTOR W. G. MACKENZIE.—Ibid., 1890, vol. xli, p. 156.
13. A. W. MAYO ROBSON.—' Clin. Soc. Trans. Lond.,' 1895, vol. xxviii, p. 83.
14. SABOURIN.—' Arch. de physiol. norm. et path.,' Paris, 1883, p. 52.
15. KOTLAR.—' Zeitschr. f. Heilk.,' Berl., 1894, Bd. xv, S. 121.
16. GILBERT AND CLAUDE.—',Compt. rend. Soc. de Biol.,' Paris, 1895, p. 841.
17. VINCENZO.—' Rif. Med.,' Nov. 16th, 1904; also Epitome, 'Brit. Med. Journ.,' 1905, vol. i, p. 25.
18. CHARLES MURCHISON.—' Diseases of the Liver,' 1877, second edition, p. 246.
19. HILTON FAGGE.—'Text-Book of Medicine,' 1886, vol. ii, p. 270.
20. FRÄNKEL.—'Zeitschr. f. klin. Med.,' Bd. v, 1882, S. 107.
21. KESTER.—'Centralb. f. inn. Med.,' 1896, S. 213.
22. H. D. ROLLESTON.—' Diseases of the Liver,' 1905, p. 342.
23. T. L. ANDERSON.—'Australasian Med. Gaz.,' 1899, vol. i, p. 93.
24. LANCEREAUX.—'Traité des mal. du foie et du pancreas,' 1899, p. 662.
25. BAYARD HOLMES.—' Annals of Surgery,' 1906, vol. xliii, p. 800.
26. SPOLVERINI.—' Rif. Med.,' May 18th, 1907; also Epitome, ' Brit. Med. Journ.,' 1907, vol. ii, p. 33.

OTHER REFERENCES.

CRUVEILHIER.—' Anat. path. générale,' tome iv, p. 839.
GAUCHER.—' Bull. Soc. anat. de Paris,' 1879, p. 545.
RILLIET ET BARTHEZ.—' Mal. des Enfants,' 1894, vol. iii, p. 1273.
TOUPET.—' Bull. Soc. anat. de Paris,' 1886, Tome lxi, p. 647.
PILLIET.—' Thèse de Paris,' 1891; also ' Progrès Méd.,' 1892, No. 3.
MARMOREK.—' Arch. gén. de Méd.,' Nov. 24th, 1903.
CLEMENT.—' Virchow's Archiv.,' Bd. cxxxix, S. 35.
MILIAN AND HERTZ.—' Bull. Soc. anat. de Paris,' 1900, p. 153.
WARING.—' Diseases of the Liver, Gall-bladder, etc.,' p. 108.
HANOT AND GILBERT.—' Arch. gén. de Méd.,' 1889, t. ii, p. 513.
E. LAUTH.—' Thèse de Paris.'
MACPHEDRAN AND CAVEN.—' American Med. Journ.,' May, 1893.
E. WAGNER.—'Deutsch. Arch. f. klin. Med.,' 1884, Bd. xxxiv, p. 534.

Tuberculosis of Gall-ducts.

SIMMONDS.—' Deutsch. Arch. f. klin. Med.,' 1880, Bd. xxvii, p. 452.
L. TUBLET.—' Thèse de Paris,' 1872.
SABOURIN.—' Arch. de physiol. norm. et path.,' 1883.

CHAPTER XV

TUBERCULOSIS OF THE SPLEEN AND PANCREAS

THE spleen resembles the liver in this respect, that its involvement in tuberculosis is of interest much more from a pathological than from a clinical point of view. A further resemblance exists in the fact that the disease is usually only a part of a much more general infection of the whole system. It presents, however, this distinction, that it is much more frequently invaded by the tubercle bacillus, and is, as a rule, more extensively implicated. According to Northrup (1) and Bovaird (2), who have directed especial attention to the order in which the viscera are most frequently involved in children, the spleen, in cases of diffusion of tuberculosis from a primary focus in the bronchial glands or lungs, takes precedence to the liver, brain, and kidneys.

As regards the relative frequency of infection in all cases of general tuberculosis, Guthrie (3) found that out of seventy-seven cases of children dying from tuberculosis, twenty-four showed the spleen to be infected; in thirteen of these the disease was advanced, in eleven the organ was only slightly involved. Manicatide (4) examined carefully the spleen in twelve successive cases of tuberculosis in children. Some of the cases were acute, others subacute. Naked-eye evidences of tubercle were observed in eight, microscopical evidences only in two. The tubercular nature of the lesions was confirmed in all cases by microscopical examination.

The medium by which the organ is infected must be the splenic artery, for on examination of the various specimens, with only one exception did I meet with anything approaching a localised deposit of tubercle; and even this case (see Fig. 39) could hardly be considered typically local.

The type is that of a universally and almost equally distributed sprinkling of tubercular nodules throughout the organ.

Great differences exist in the size of the nodules, and in the density of their diffusion throughout the splenic substance; but the uniformity of the distribution is such as to render the process of infection impossible of explanation, except on the ground that the bacilli have been distributed by the radicles of the splenic artery.

It is of interest to note, as supporting the view that infection probably takes place early in the case of the spleen, that in

FIG. 37.—The peritoneum peeled off the surface of the spleen to show numerous tubercular nodules. (Royal College of Surgeons.)

most of the mounted specimens, and in the cases recorded, the tubercular deposits were of considerable size, that is, caseating nodules rather than miliary tubercles were found to be present more frequently.   In the museum of St. Mary's Hospital is a specimen (No. 196) taken from a girl, aged ten years, who died of "general abdominal miliary tuberculosis."   It is seen thickly studded with small grey miliary tubercles.   With the exception of this specimen all the others presented tubercular caseous masses.   These nodules are sometimes distinctly seen

upon the surface of the organ, as in the preparation (No. 2878) in the Royal College of Surgeons from which Fig. 37 is taken; the peritoneum has been stripped off, and masses of tubercular matter, from ½ to 1 line in diameter, are seen very thickly scattered about. It was removed from a child aged ten years, who had been ill for two months with disordered digestion

Fig. 38.—Section through a tubercular spleen, showing small cavities, the result of softening and falling out of the caseous contents. (St. Thomas's Hospital.)

and intermittent fever. Tubercles were also found in the liver. A somewhat similar specimen (No. 308) exists in the museum of University College Hospital; rounded nodules are seen projecting on the surface of the organ, which it is noted " is very much denser than natural." An even more striking example than either of the above is to be found in the museum

of the Brompton Hospital for Consumption (No. 349).   The surface of the spleen is seen to be nodular owing to the protrusion through the capsule of a large number of caseous nodules of various sizes.   On section the organ was found to be infiltrated with large firm tubercular masses, the interstices containing tubercles of miliary size.   It was removed from a girl, aged five years.

The appearance presented by the spleen on section is very typical, although much variation exists in regard to the shape, size, distribution, and consistency of the nodules.   It may be considerably enlarged, forming a distinct abdominal tumour as illustrated in Marriot's (5) case, to be presently referred to. One of the best preparations illustrative of the disease as at present considered is in the museum of Charing Cross Hospital. Its perfection is largely due to the process of mounting (formaline), which has preserved the colour of the tissues in such a way as to bring out by strong contrast the caseous nodules.   It was removed from a child aged only three months. Fig. 38, although a somewhat advanced type of caseation, gives a fairly good impression of the appearances most commonly met with.   The specimen (No. 1433) is in the museum of St. Thomas's Hospital.   The tubercular nodules are seen more or less uniformly scattered throughout the substance of the viscus ; but as indicating the somewhat advanced stage of the disease, it will be noticed that in many of the nodules the centre has softened and fallen from the divided surfaces, thus leaving small cavities.

A still more advanced stage in the disease is represented by large tubercular masses formed as the result, probably, of the conglomeration of several caseous nodules.   Should these break down comparatively large abscesses may be formed.   The condition is probably very rare, but there is a specimen (No. 3211) in the museum of the University College which at least suggests such a possibility.   It represents a piece of the spleen of a monkey.   The cut surface is seen to be spongy in appearance owing to the breaking down of the tubercles.   Here and there small isolated nodules are seen broken down in the centre, but for the most part these have coalesced so as to form large patches.   In these more extensive areas small abscess cavities are seen.

Equally rare as the formation of tubercular abscess appears

to be the transition of caseation to calcification, and yet that this is possible is strikingly represented by a specimen (No. 1355B) in the museum of Charing Cross Hospital from which Fig. 39 was taken. It is a spleen from a case of old tubercular peritonitis. The large tubercular masses in the substance of the organ were caseous and calcified, and so hard that it was sectioned with the greatest difficulty. The mesenteric glands, many of which were as large as a pigeon's egg, resembled the splenic masses. The specimen was taken from a woman, aged twenty-two years, who died of carcinoma of the cæcum. The *post-mortem* was made by Dr. W. C. Bousanquet, who in his report

Fig. 39.—Section through a tubercular spleen showing large caseous masses which in parts had undergone calcification. (Charing Cross Hospital.)

expressed the opinion that the case was one in which carcinoma and tubercular peritonitis co-existed.

It need hardly be said that neither symptoms nor treatment can form any part in the discussion of splenic tuberculosis; and yet what might be practically termed an accident led to the successful removal of a spleen which was subsequently discovered to be tubercular. Indeed the case presented this further feature of unique interest, that so far as could be ascertained the spleen appeared to be the only internal organ infected; in other words, that the case was one of primary disease of the viscus. With so much that is rare and interesting about the case, I am tempted to give a tolerably full extract of it from the 'Transactions' of the London Pathological Society, before which the specimen was presented and described by Marriot.

CASE XXXIV. *Acute tuberculosis of the spleen; splenectomy; cure.*

The patient, a woman, aged thirty-two years, was admitted to a hospital for a large abdominal tumour, which was first noticed two years previously. She had had one child about three years before, and no miscarriages; there were no signs of syphilis, and her husband had never suffered from any venereal complaint. She had, however, been troubled with ulceration of the vulva on two occasions during the last eighteen months, but this got quite well with simple remedies. The abdominal tumour caused little or no pain; it steadily enlarged at first, then the increase in size became much more rapid. As the diagnosis was doubtful an exploratory laparotomy was performed and an enlarged spleen removed. She made a good recovery after the operation, and at the end of eighteen months she was in perfect health.

The spleen when examined after removal was found uniformly enlarged, measuring 8 inches in length, 5 inches from side to side, and 3 inches in thickness. The natural outline of the organ was preserved, and the impressions of the adjacent viscera on its surface were well seen. There were two notches on the anterior border, but neither of them were very distinct. The serous coat was smooth throughout, save for a few tags in front. The convex aspect of the spleen closely resembled a "hobnail" liver, being studded with coarse round nodules which projected slightly beyond the general level of the peritoneum. In appearance the cut surface of the specimen was like that of its convexity, for the splenic pulp was stuffed with yellowish-white, slightly raised deposits in all parts of the section. Microscopical examination revealed the presence of numerous grey tubercles, clustered for the most part, thus explaining the nodules above described. There was very little caseation, and the most striking feature of the tubercles was the large size of the so-called epithelioid cell which surrounded the central giant cell.

It was considered that possibly the chronic ulcer of the vulva had been the primary seat of the infection, although the character of the ulcer had not been verified as tubercular.

The specimen is preserved in the Museum of the Royal College of Surgeons.

PANCREAS.

While the pancreas cannot claim exemption from invasion by the tubercle bacillus, it is certainly much less involved than either the liver or the spleen. There seems little doubt that

so far as the early literature of the subject is concerned, the scarcity of any references to tuberculosis of the pancreas is partly to be accounted for by the casual examination which this gland often underwent in the earlier periods of *post-mortem* examinations, and that more careful investigations in recent years into the various diseases which affect the organ has led to the more frequent discovery of its involvement in tubercular disease. It still, however, remains practically a pathological curiosity; and so far as is known, the organ when invaded possesses no symptoms and presents no other signs by which it may be recognised.

The relative frequency of the disease is shown by some statistics given by Oser (6). In 128 consecutive cases of tuberculosis, twelve showed positive evidence of tubercular lesions in the pancreas, making a percentage of 9·37. In eighteen cases of general miliary tuberculosis, Kudrewetzky (7) found the pancreas to be involved in six, that is, in 33·33 per cent., most of which were children. The same observer found that in the case exclusively of tubercular children as many as 44·44 per cent. presented pancreatic tubercular lesions. Holt (8), out of 119 cases found the pancreas the seat of small tubercular nodules in three; in all of these there was general tuberculosis. Guthrie (9), out of seventy-seven *post-mortems* upon cases of tuberculosis in children found only one case, but in this the disease was advanced. Hale White (10) in a series of 142 *post-mortems* found the pancreas tubercular in four; in three of these the patients suffered from general tuberculosis, in the fourth there was tubercular peritonitis.

It will thus be seen from the above statistics that the affection of the gland seems to be a commoner concomitant of the disease among tubercular patients on the continent than in our own country. Another fact exhibited is the much more frequent involvement of the organ in tuberculous children than in adults; also that the disease is usually part of a generally distributed tuberculosis, or secondary to a lesion or lesions elsewhere in the body.

The question of the primary origin of the disease within the gland seems to be doubtful. Senn (11), however, states, without any very strong evidence in support, " we have reliable information that in a number of cases this gland was the primary seat of the process." The opinion appears to be based

on two cases referred to by most writers on the subject of pancreatic disease, neither of which, however, does it seem possible to accept as unequivocal examples of such a primary manifestation. The one case is reported by Aran (12) so early as 1846. It was that of a woman, aged twenty-five years, who died of a lingering disease. She had been sick for a year, during which time she felt exceedingly weak, had frequent attacks of vomiting, and the skin became deeply bronzed, in some places almost black. The pain, which was severe at times, was referred to the epigastrium. The necropsy showed a tubercular deposit in the tail of the pancreas the size of a hen's egg, surrounded by a zone of miliary deposits in the substance of the gland. Miliary tubercles were also found in the spleen.

The other case is narrated by Mayo (13) at an even earlier date—1836. The patient was a man, aged thirty-eight years, who had been ill for sixteen weeks, during the last seven of which he was confined to his bed. The first symptoms were pain in the abdomen extending along the right hypochondrium to the spine. Twenty-eight days before death he became jaundiced, stools white, urine high coloured; for some time he could lie on the right side only, often obliged to sit upright to draw breath. A large abdominal tumour had been felt immediately above the umbilicus some time before death, and the right arm and side of the neck had become œdematous. Upon opening the abdomen the liver was found to occupy the epigastrium and part of the right iliac region. . . . Its position resulted from the effusion of serum into the right cavity of the chest. The gall-bladder was distended so as to contain eight ounces of fluid. The distension arose from an enlargement of the pancreas, the head of which formed an irregular sphere 4 inches in diameter, which had compressed the gall-duct; the rest of the gland was likewise enlarged. In parts it preserved its natural texture and colour, at other parts it was infiltrated with tuberculous matter, which at two or three points had softened and formed thick pus. One or two lacteal glands were softened and contained tuberculous matter. Three or four scrofulous (sic) tubercles were found in each of the kidneys. The left pleura was coated with recent lymph; the fluid which it contained was a dark amber-coloured serum. The thymus gland was enlarged to a considerable size, and formed with the adjacent lymphatic gland a mass which was extensively infil-

trated with tuberculous matter, and which at the posterior part had softened. The upper cava passed through the mass and divided in it; the right vena innominata was greatly compressed by it, the left less so ; nodular projections of the tumour pressed upon and had caused thinning of the vein, and projected into it.

In both these cases it will be noted that other organs and tissue contained tubercular lesions, and this more particularly applies to Mayo's (13) case. With the more exact knowledge we now possess of the channels by which the tubercle bacillus makes its entrance into the body, and how long it may remain latent in various centres, it becomes very unlikely that an organ so little predisposed to involvement, even under the most favourable conditions for infection, should be the first in the body to take on the disease.

The channels by which the pancreas may be infected are probably limited to the blood and to direct contact with the disease in its immediate vicinity. The question of infection by means of the duct of Wirsung, while possible, is usually regarded as extremely unlikely, for as in the case of the bile-ducts the bacilli would have to make their entrance and traverse a canal against the natural current of the secreta.

As regards the nature of the lesion the pancreas when once involved presents no differences in the form which the disease may assume as compared with its manifestation in other organs. When containing miliary tubercles the gland may be somewhat enlarged and hardened as illustrated in a case recorded by Barlow (14). The specimen was removed from a child, aged one year and eleven months, who died of general miliary tuberculosis ; the head of the pancreas showed several tubercles, each about the size of a pin's head. But miliary tubercles are often found associated with large tubercular deposits, forming a kind of peripheral extension of the disease.

The presence of caseous masses within the pancreas has been noticed in not a few cases, and the only specimens to be found in the museums are illustrative of this form of the disease. In the museum of St. Bartholomew's Hospital there is the pancreas .of a child (No. 2272A) who died of tubercular meningitis. At the lower end is seen a deposit of white tubercular matter, while just above this is a small cavity formed by the breaking down of similar material. It was exhibited at the Congress on

Tuberculosis held in London in 1901. Among some recorded cases may be instanced Hamilton's (15). In this case the pancreas showed in its substance large caseating areas. The patient was a coloured girl, aged eleven years; at the necropsy very extensive tubercular implication of most of the thoracic and abdominal organs was found. Ormerod (16) reported the case of a child with general tuberculosis in which two or three small caseous patches, as well as a cavity which contained broken-down caseous substance, were found in the pancreas. Hartmann (17) mentions a case in which the pancreas had disappeared completely and its place was occupied by a cheesy mass.

When caseation has advanced to the extent of forming a chronic abscess, the pseudo-pus which the cavity contains may make its way into other parts. Mayo Robson (18) records an instance of an abscess so formed burrowing behind the peritoneum and presenting in the loin like a spinal abscess. Oser (6) also refers to such abscesses bursting into the stomach, and a case is related by Kudrewetzky (7) in which such an occurrence took place.

There seems little doubt that in many cases of supposed tubercular caseation of the pancreas the real source and seat of the disease is in the lymphatic glands, either in those placed immediately external to the gland, or in those which often appear to be embedded in its substance. Where a careful microscopical examination has been made of the caseous foci it has not unfrequently been found that the tissue involved was that of a lymphatic gland and not that of the pancreas. Indeed, it would appear as if the most striking examples of large caseous masses in the immediate neighbourhood of the pancreas were often really disease of the lymphatic glands and not of the pancreas. The specimen from which Fig. 40 is taken is a somewhat striking illustration of this. It is to be found in the museum of St. Mary's Hospital (No. 307), and shows the duodenum and a portion of the pancreas embedded in a mass of caseous tubercular glands; it was removed from a man, aged forty-four years, who died of general miliary tuberculosis. The case recorded by Robson-Moynihan (19) is also probably an illustration of the same. The patient was a man, aged forty-two years. When admitted to hospital a tumour about three inches in diameter could be felt to the right of the middle line just below the costal margin. The mass was dull on percussion

and moved only slightly with respiration. The liver could be felt to glide over the swelling on deep inspiration. There was evident pulsation communicated by the aorta. At the operation a caseating mass was found behind the stomach, and a

Fig. 40.—A caseous mass of tubercular glands in the region of the head of the pancreas and surrounded by the duodenum. (St. Mary's Hospital.)

number of caseating glands were felt and seen in the lesser omentum. The patient became so collapsed in manipulating the tumour, which was occupying the site of the head of the pancreas, that nothing further could be done. The wound healed and he was discharged.

The case so often referred to as an instance of successful excision of a portion of a tubercular pancreas by Sendler (20) was, as shown by microscopical examination, nothing more than the enucleation of a tubercular lymphatic gland, about the size of a walnut, from the region of the head of the pancreas. Even Mayo's (13) case referred to above, considering the early period at which it was published—1835—is not unlikely to be one of the kind under discussion, for the large tumour was situated in the head of the pancreas just at the spot where the lymphatic glands are most numerous and most often affected. Robson's (19) case likewise, from the lack of more specific confirmation, is open to a certain amount of doubt in this particular respect.

This question of lymphatic gland involvement and not pancreatic infection is of sufficient interest to render it imperative that every case should be minutely investigated before any positive assertion is made. It is not unlikely that the more accurately the investigation is carried out in every suspected case the less frequently will it be found that the disease is exclusively in the pancreatic tissue : in other words, that, as held by many, especially the older pathologists, the pancreas may, after all, be comparatively rarely the seat of tuberculosis.

In addition to the infection of the gland through contiguity to tubercular lymphatic glands, direct infection may take place from the peritoneum, and from the kidney, as instanced by one of Carnot's (21) cases, where a tubercular left kidney infected the tail of the pancreas.

There is yet another possible phase of the disease manifested by a condition of cirrhosis of the gland. The same kind of lesion has been referred to in discussing tuberculosis of other organs, and it seems probable that the pancreas is not exempt from being similarly affected. Harris (22) examined the condition of the salivary glands in cases of chronic tuberculosis ; he found in some three or four instances that more or less distinct cirrhosis was present, " varying from an almost general change—so marked in one case that the gland cut under the knife like cartilage, and to the naked eye seemed like a piece of hard fibrous tissue—to a commencing patchy infiltration, localised to small districts of the gland. The pancreas was also examined, and presented, but in a less degree, very much the same condition as the salivary glands."

Carnot (21), as quoted by Opie, examined the pancreas in

patients dying with tuberculosis, and while in the majority no lesion was demonstrable, in seven cases he found a variable, usually moderate grade of chronic inflammation, causing, in most cases, an increase of the connective tissue normally present about the vessels and ducts and between the lobules.

It would thus seem, as has been explained in the case of the other internal abdominal organs, that some toxic influence is exercised upon the intra-glandular tissue which excites a condition of fibrosis.

The questions of diagnosis and treatment call for little comment. The symptoms manifested in the few recorded cases are practically of no diagnostic value. The fact that a tumour exists in the region of the pancreas, when taken into consideration with other facts suggestive of tuberculosis in the patient's body or family history, may lend some aid towards indicating the possible nature of the swelling. At best, however, any positive diagnosis in a disease so rare must be purely speculative, and treatment must equally be a matter of judgment to be exercised on the nature and extent of the disease revealed by operation.

AUTHORS REFERRED TO.

Spleen.

1. NORTHRUP.—'New York Med. Journ.,' Feb. 21st, 1891.
2. BOVAIRD.—*Ibid.*, July 1st, 1899, p. 6.
3. LEONARD G. GUTHRIE.—'Lancet,' 1899, vol. i, p. 286.
4. MANICATIDE.—'Rev. des Mal. de l'Enf.,' tome xiv, p. 88; also 'Brit. Med. Journ.,' Epit., 1896, vol. i, p. 45.
5. C. H. MARRIOT.—'Trans. Path. Soc. Lond.,' 1896, vol. xlvii, p. 97.

Pancreas.

6. OSER.—Nothnagel, 'Specielle Path. u. Therap.,' 1898, Bd. xviii, Theil II, p. 228.
7. KUDREWETZKY.—'Prag. Zeitschr. f. Heilk.,' 1892, p. 101.
8. HOLT.—'Diseases of Infancy and Childhood,' 1897, p. 1032.
9. LEONARD G. GUTHRIE.—'Lancet,' 1899, vol i, p. 286.
10. W. HALE WHITE.—'Guy's Hospital Reports,' vol. liv, p. 39.
11. N. SENN.—'The Surgery of the Pancreas,' 1886, p. 120; also 'Trans. of the American Surg. Assoc.,' 1886.
12. ARAN.—'Arch. gén. de Méd.,' 1846.
13. HERBERT MAYO.—'Outlines of Human Pathology,' 1835, p. 410.
14. THOMAS BARLOW.—'Trans. Path. Soc. Lond.,' 1876, vol. xxvii, p. 173.
15. ALICE HAMILTON.—'Johns Hopkins Hosp. Bull.,' 1897, No. 73, p. 78.

16. J. A. ORMEROD.—'Trans. Path. Soc. Lond.,' 1890, vol. xli, p. 161.

17. HARTMANN.—See Chvostek, 'Wien. Med. Blätter,' 1879, S. 791.

18. A. W. MAYO ROBSON.—'Encyclopædia Medica,' 1901, vol. ix, p. 90.

19. ROBSON-MOYNIHAN.—'Diseases of the Pancreas,' 1903, p. 278.

20. PAUL SENDLER.—'Münchener med. Wochenschr.,' 1896, i, 12; also 'Deutsch. Zeitschr. f. Chirurgie,' 1896, Bd. 44.

21. CARNOT.—"Recherches sur les Pancréatites," 'Thèse,' Paris, 1898; also quoted by Opie, 'Diseases of the Pancreas,' 1903, p. 204.

22. VINCENT DORMER HARRIS.—'Journ. of Path. and Bact.,' 1898, vol. v, p. 302.

OTHER REFERENCES.

BRUEN.—'Philad. Polyclinic,' 1885, p. 7.

MARTLAND.—"Tuberculosis of Liver and Pancreas," 'Edinburgh Med. and Surg. Journ.,' 1825, p. 73.

SANDRAS.—'Rev. méd. Franc.,' 1848, p. 279.

LANCEREAUX.—'Traité des malades du foie et du pancréas,' Paris, 1899.

CHAPTER XVI

TUBERCULOSIS OF THE FEMALE GENITAL ORGANS: TUBERCULOSIS OF THE UTERUS

FIVE-AND-TWENTY years ago comparatively little was known and very little said about tubercular disease of the female organs of reproduction. Scattered references there were, but it was probably due to Professor Hegar more than to anybody else that the subject came into full recognition. From that time onward the subject of tuberculosis of these viscera has increased both in interest and importance. Among some of the reasons which may be given for this awakened interest are the possible parts played by the disease in inducing a more widespread infection ; in other words, the uterus and adnexa becoming primarily involved may prove a source of more serious disease elsewhere, by direct or indirect extension. Another reason of considerable cogency is the fact that abdominal surgery in its advance has frequently to encounter disease of the pelvic viscera, and an accurate knowledge of the pathological lesions discovered becomes of greater importance in view of the operations proposed.

The subject is one which naturally falls more strictly within the domain of the gynæcologist; but since abdominal surgery has come to occupy so all-important a position in general surgery, it behoves every surgeon to make himself fully cognisant of every condition within the abdominal cavity, whether it be a disease of some organ in the major portion of the peritoneal cavity, or of one in the minor or pelvic part.

I propose to deal, in the first place, with the uterus, although the Fallopian tubes are the parts of the genitals which are most frequently infected, and the ovaries the least.

ÆTIOLOGY.

Tubercular disease of the uterus may be found at any period of life, and as indicating approximately the relative frequency,

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some statistics by Turner (2) and by Still (3) may be quoted. The former examined the female genital organs of twenty-seven consecutive cases of phthisis in the *post-mortem* room of the Brompton Hospital. In one of these the tubes alone were involved ; in two the tubes and body of the uterus ; in one the tubes, body of uterus and cervix ; and in one the tubes, body of uterus, and the ovary. All the five cases were examples of chronic phthisis, and all presented some degree of intestinal ulceration. Tubercles of the peritoneum covering the genital organs were left out of account as they presented nothing special to those organs. Still examined, *post-mortem*, the bodies of 127 tubercular female children under twelve years of age. Thirteen presented tubercular disease of the genital organs. In all there was caseation of the mucous membrane of the tubes ; in eight the endometrium was caseous, or the fundus was distended with pus or caseous material. In only one were the ovaries noted as tubercular, being in that instance caseous almost throughout. It is of interest to notice that, in the matter of age, the disease occurred in seven out of these thirteen cases within the first two years of life ; the youngest was eight and a half months. The earliest age at which the uterus was involved is not specifically stated. The disease is rare in old age, but the case of a woman aged seventy-nine years has been recorded by Kiwisch (4).

The disease appears to be in the large proportion of cases secondary ; but there are not wanting many proofs that the infection can be primary. The co-existence of uterine tuberculosis with other systemic manifestations of the disease naturally·raises the question of relationship—whether the one is dependent upon or the cause of the other. The point can only be settled by comparing the supposed pathological age of the respective lesions, and the result of such comparison is usually in favour of the uterus being secondarily involved. When we are dealing, however, with an infection limited to the genital organs, the question becomes simplified, and little doubt can then be entertained that the disease there is primary in origin. Numerous isolated cases have been published in recent years illustrative of a supposed primary infection, and interest has been awakened regarding the channels by which such an infection could take place.

When secondarily affected, it appears to be most frequently through an extension from the disease in the Fallopian tubes, these again being simply transmitters by direct continuity—as will be later discussed—of infection in the peritoneum and elsewhere. Then, again, infection may be brought about by impregnation of the blood and lymph with tubercular material from foci existing in other parts of the body. Before, however, such an invasion takes place, it seems probable that some preparatory influences must be exercised on the part of the uterus itself. These are likely to be found in some of the many chronic inflammatory changes which are prone to take place in the lining wall of the uterus. It is simply a weakening of some of the normal resisting powers of the tissues, which, in every part of the body, always predisposes to tubercular invasion if the virus is at the time circulating through the enfeebled part.

Much contention has arisen over the possibility or not of the uterus and tubes being primarily affected through the introduction of tuberculosis *per vaginam*. The possibility, however, seems undeniable; and not a little support is lent to this view from various experiments which have been performed to show that even inorganic matter can make its way upwards from the vagina to the peritoneal cavity by way of the uterus and Fallopian tubes. Bond (5) introduced into the vagina of women, upon whom it was likely abdominal section would be necessary for other reasons, a little coloured pigment. In most cases purified and sterilised indigo, but in a few carmine, was employed, and placed upon, or inserted just within the os uteri, at varying periods up to twenty hours before operation. Careful microscopical examination of the Fallopian tubes in these cases nearly always showed the presence of indigo or carmine particles ; while in several the pigment was found on the peritoneal surface of the broad ligament, mesosalpinx, and the fimbriæ of the Fallopian tubes. It has also been shown that guinea-pigs inoculated with tubercle bacilli are capable of transmitting the disease through the semen. Gärtner (6), experimenting with female guinea-pigs, found that out of sixty-five cohabiting with males whose testicles had been rendered tubercular, five died of tuberculosis, the disease starting from the vagina. Independently, however, of experiment, there is apparently good evidence to show from cases reported by Hegar (7), Glocker (8),

Ferner (9), and Schuchard (10), that women have been directly infected through their husbands.

Other external sources usually mentioned are infected hands or instruments, and contamination by tubercular fæces and urine. If further evidence were needed in support of the possibility of an ascending infection, it may reasonably be said to exist in gonorrhœal salpingitis and peritonitis where there can be no doubt as to the upward course taken by the specific organisms of this disease. Senn (11) attaches no little importance to the possible infection of the body of the uterus during or after parturition through the agency of the placenta. "It requires," he says, "no stretch of the imagination to conceive that in tubercular mothers, with or without demonstrable tubercular lesions, localisation of tubercle bacilli would be more likely to take place on the maternal side of the placental circulation, and after delivery would manifest itself in the form of a puerperal metritis." He further believes that this explanation of the ætiology of puerperal tubercular endometritis will be substantiated by future experimentation and clinical observation.

As practical illustrations of primary disease of the uterus a few cases may be briefly cited. Hanschka (12) records the case of a married woman, aged twenty-nine years. She was well nourished, and had no evidence of tubercular disease in the lungs, joints, or peritoneum. Her principal symptom was a yellowish discharge, occasionally tinged with blood, occurring for several months previously. The uterus and adnexa were removed, when it was found that the cervical canal was deeply ulcerated and filled with irregular protuberances suggestive of carcinoma of the cervix, and the whole endometrium infiltrated with tubercle. The epithelium was perfect in the Fallopian tubes, but there were traces of tubercle in the mucosa; the ovaries and peritoneum were not infected. Nebesky (13) reports the case of a woman, aged thirty-three years, who for eight months had been subject to menorrhagia, and for a week before coming under observation, from severe sacral and epigastric pain. There was no history of tubercle. The uterus was tough, somewhat enlarged, anteverted and drawn towards the sacrum by a mass of cicatricial tissue behind it; the appendages were evidently involved in the dense tissue. Curettage of the uterus removed quantities of broken-down material in which the tubercle bacillus was discovered. The cervix and

uterus, together with the tubes, were removed, but the ovaries being considered healthy were left. The patient was in very good health a year after the operation, with no symptoms of tubercular disease. A careful examination of the parts removed revealed advanced tuberculosis in the cervical canal, much less in the endometrium, and still less in the tubes. For these various reasons, therefore, Nebesky regarded the case as one of primary tubercular disease of the uterus, or more strictly of the cervix. Young (14) records the case of a married woman, aged twenty-six years. She had had three healthy children, and her husband was quite healthy. No family history of tuberculosis. Her catamenia were regular up to six months before coming under observation, when they became lengthened, and for five weeks she had had a thick yellow inoffensive discharge from the vagina, coupled with constant aching pain in the lower abdomen and sacral region. A careful examination of the patient in all parts revealed no evidences of tubercle. The cervix was indurated and greatly enlarged, its surface uneven and ulcerated in places, and in places nodular and papillary. The parts were submitted for examination to Dr. Williamson, of St. Bartholomew's Hospital, who reported that the bacillus was not found, but from the character and distribution of the giant cells, from the presence of numerous typical tubercles bounded by well marked fibrous tissue bands, and from the areas of caseation, he had no hesitation in pronouncing the specimen to be tubercular. Cases of exclusive involvement of the cervix are perhaps among the best illustrations of primary infection of the uterus.

PATHOLOGY.

It is possible for infection of the uterus to take place without any preparatory lesion, but it is more probable, judging from the analogy of the disease as it attacks other parts, that there has been some devitalising influence at work, whereby the normal resisting powers of the tissues become reduced and the invasion of the tubercle bacillus permitted.

The commonest seats to find the disease are in the cornua. Here it is almost without exception an extension downwards from the diseased Fallopian tubes. Sometimes it is limited to the body of the organ, and may in such cases be the result of

placental infection.   In other cases, again, it involves exclu-
sively the cervix, and as the disease advances it may implicate
the whole lining wall of the organ and extend deeply into its
muscular parietes.   It has, however, been noted that when the
disease primarily attacks the cervix it is usually limited to that
region ; exceptions, however, to such limitations are not want-
ing.   In a case described by Horrocks (15) the uterus, when
removed from a patient aged seventy years, showed that the
disease had extended throughout the entire endometrium, cer-
vical as well as corporeal.

Attempts have been made by various authors to classify
tubercular diseases of the uterus, or to differentiate between
certain stages of the disease.   There is little doubt, however,
that no sharp line of demarcation can be drawn between any
two stages, and that between the simplest form of miliary
depositions and the most extensive destruction of the uterine
parietes by caseation and necrosis, there is every possible
gradation in the known progress of tuberculosis.   If, however,
one particular form should be singled out, it would be that in
which the disease assumes a somewhat fibroid character, the
uterus being thickened and enlarged.

The initial process is, in most cases, the deposition of miliary
tubercles in the endometrium; then follow those various
changes so well known and described in other parts of the
body.   The tubercles coalesce, and the result of this coalescence
and enlargement is the production of different types of the
disease.   Thus the internal surface of the uterus, either in
whole or in part, may present a thick and pulpy appearance, as
well exhibited by a case described by Horrocks (16) ; or there
may exist a uniform tuberculated or nodular condition.   This
is well shown in Fig. 41, which is the photograph of a
specimen in the Pathological Museum of St. Bartholomew's
Hospital (No. 2952ᴅ).   When the tubercles caseate and break
down they may leave an irregular surface comprised of shreddy
necrotic tissue.   This is seen in Fig. 42, taken from a specimen
in Guy's Hospital Museum (No. 2251[41]).   Not only may this
caseation and process of necrosis extend to the surface of the
endometrium, but the muscle wall of the organ may be invaded
as shown in Fig. 43, taken from a specimen in St. Thomas's
Hospital Museum (No. 2416).   In this particular instance the
uterine cavity was found filled with caseous material ; not only

was the mucous membrane destroyed, but the subjacent muscular tissue similarly affected to a considerable extent. This destruction of the whole body wall led, in a case recorded by Cooper (17), to rupture of the uterus during pregnancy. In some cases where the disease has not reached such advanced destructive stages, as in the examples just cited, ulcers of

FIG. 41.—Tuberculosis of the uterus. The endometrium is seen roughened and nodular in its whole extent. (St. Bartholomew's Hospital.)

various shapes and sizes may be found implicating the endometrium. In some rare instances the cervix becomes occluded, with the result that the cavity of the uterus enlarges, the parietes become thinned, and the whole organ converted into a kind of sack containing purulent caseous *débris*. An example of this condition of tuberculous pyometra is described by Targett (18). This same author also refers to, and gives a

pictorial representation of a case of the fibroid form of tuber-
cular disease of the uterus. The whole lining membrane of
the body of the viscus was thrown into coarse rugæ and
nodular projections by a diffuse tubercular infiltration of the
endometrium, without ulceration. There was marked hyper-
trophy of the muscle coat. It would seem that in some rare
cases the uterus becomes similarly affected to the Fallopian
tubes and the intestine. The hyperplasia which takes place and
causes the uterus to assume a thickened and fibroid character
is the result of some tubercular toxic influence, in which,
while the bacilli themselves are not usually discernible, the
tissues are stimulated to changes that result in the character-
istic enlargement and induration of the organ. The subject
will be referred to again in discussing the pathology of the
Fallopian tubes.

A somewhat unique case is described by Bland-Sutton (19).
In this instance the tubercular process was comparatively
limited, forming a rounded mass which projected from the
anterior wall towards the uterine cavity. The uterus, which
was successfully removed, now exists as a specimen in the
Royal College of Surgeons (A4598). As specimens illustrative
of uterine tuberculosis the following preparations may be
referred to: In Guy's Hospital Museum No. C.R.A. 97[201]
shows a senile uterus with tubercular infiltration ; No. 863 is
a tubercular endometritis ; No. 2261[75] exhibits a uterus full
of a soft cheesy matter, and an internal surface which is
irregular and granular and devoid of its mucous membrane.
In the museum of the Westminster Hospital is a specimen
(No. 1063) which shows the interior of the uterus to be the
seat of tubercular ulceration.

That tubercular lesions of the uterus may undergo repair,
as in other parts of the body, is exemplified in a case recorded
by Jordan Lloyd (20). A woman, aged thirty-six years, died
from acute general pulmonary tuberculosis. The uterus, when
examined, was found to have its cavity obliterated and to
contain old cretaceous tubercular deposits.

The pathological lesions met with in the cervix are worthy
of separate consideration, because of the important part they
play in the question of diagnosis.

That the cervix may be primarily infected there can now be
no doubt, much as this mode of invasion was questioned by the

older pathologists and clinicians.   Quite a number of cases
have now been recorded, and accepted by good authorities as
reliable illustrations.   Kynoch (21), in describing a case refers
to others, and indicates that the disease may manifest itself in
three varieties : (1) An ulcerating form, the ulcer being
characterised by sharply-defined edges, softness of the floor,
and absence of marked induration and friability ; (2) miliary
tuberculosis representing the early stage of the ulcerating
variety ; and (3) a papillary form, involving the cervical

Fig. 42.—Tuberculosis of the uterus and Fallopian tubes.   (Guy's Hospital.)

endometrium and extending into the vaginal portion.   Such
growths are characterised by finger-like processes, bright red
in colour, bleeding, it may be freely, on manipulation, soft to
the touch, and with no tendency to friability.   Vassmer (22)
adds a fourth variety, which he calls a "tubercular catarrh."

While in most instances it would appear that the internal os
acts as a barrier to the progress of the disease from above
downwards and from below upwards, there are several examples,
as already shown above, of the disease involving equally exten-
sively the whole lining membrane of the uterus, both cervical
and corporeal.

SYMPTOMS.

The symptoms of tubercular disease of the uterus are probably in most instances very difficult, if not often impossible, to distinguish. The frequency with which the disease is associated with lesions in other parts, more especially in the Fallopian tubes and the peritoneum, renders differentiation sometimes out of the question. It is probable that in the early stages of the infection, when tubercles are forming in the stroma of the endometrium, there are no symptoms, but as advance takes place menorrhagia may exist; and as soon as ulceration shows itself there is the possibility of muco-purulent discharges. In the later stages there is sometimes amenorrhœa. Pain is rarely present, and when it does exist it is usually an indication of a lesion more extensive than that which solely involves the uterus. Should a condition of pyometra follow, the consequent enlargement of the uterus may lead to its being felt as a tumour in the lower part of the abdomen. When the cervix is involved the speculum will admit of inspection of the parts, and appearances may be revealed, such as have been described above in indicating the varieties of the disease. In cases of mixed infection the vaginal discharge will be more copious and more purulent in character; at the same time there will be symptoms of more general disturbance, as shown by feverishness and greater pain on palpation of the pelvic organs.

DIAGNOSIS.

With the symptoms so few and often so indistinct, the question of diagnosis is frequently of the vaguest description. Nevertheless, when it is possible by curettage, or by the use of the knife, to remove tissue which reveals the presence of the tubercle bacillus, or the typical giant cells, a degree of certainty is reached, rendering all other indications unnecessary. Failing, however, such a direct means of arriving at a correct appreciation of a case, there are other indirect sources of information which are very helpful. Among these, none are more suggestive than the presence, or previous existence, of other tubercular lesions in the body, and a strong family history of the disease. Patients suffering from phthisis admit of the gravest suspicion being entertained that any uterine symptoms are due to a similar involvement of that organ. When the

uterus is much enlarged, as in the condition of pyometra, it may be quite impossible to discover the true nature of the enlargement.   In Bland-Sutton's (19) interesting case above alluded to, the localised tubercular collection led to the belief before operation that the case was one of a submucous fibroid.   In some instances, even after the removal of the organ, the naked eye fails to detect the true nature of the disease, and it is not until the parts are examined microscopically that the lesion is correctly determined.   When tubercles exist on the peritoneum

Fig. 43.—Tuberculosis of the uterus and Fallopian tubes.   The uterine cavity is filled with caseous material; tubercular ulceration has extended into the subjacent muscular tissue.   (St. Thomas's Hospital.)

of the fundus and posterior surface of the uterus, Penrose and Beyea (23) believe that a diagnosis can be made by dragging down the uterus with a tenaculum, and examining *per rectum*. In one of their recorded cases they were confident that had such a method of examination been adopted the true nature of the lesion would have been diagnosed.

Much interest and importance attaches to tubercular disease of the cervix, for many cases have been reported where the first diagnosis made was that of malignant disease.

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Horrocks (16) reports a case where the cervix was studded with what appeared to be swollen and distended ovula Nabothi. The condition was thought to be sarcomatous. The uterus was removed, and on section showed the entire endometrium to be thick and pulpy. The specimen was examined at the Royal College of Surgeons, and pronounced to be tubercular. Fränkel (24) and Emanuel (25) both describe cases in which a tubercular condition was mistaken for malignant disease. In the case of the former the lining membrane of both the cervix and the body was converted into granulations and papillary growths, while in that of the latter a swelling existed about the size of an apple. So greatly may the naked-eye appearances of tubercular disease simulate those of carcinoma, even after the removal of the part, that in a case recorded by Williams (26) it was not until the microscope had demonstrated the existence of giant cells and tubercle bacilli that the operators were disabused of their previous belief.

The chief point to be attended to in this differential diagnosis is the nature of the ulcerating surfaces, which in malignant disease is usually more indurated and friable. Further, malignant disease when attacking the body of the uterus may be more limited in its invasion, while tubercular disease may extend superficially through the lining membrane of both body and cervical canal. There are, however, no hard and fast lines in this respect; and a case has been recorded by Otto v. Franque (27) where tuberculosis of the uterus was complicated by the co-existence of carcinoma; the malignant disease involved the cervix, while the endometrium was extensively invaded with tuberculosis.

<center>PROGNOSIS.</center>

The question of cure turns principally upon the nature of the disease, that is to say, whether it is primary in origin, or whether it is a secondary complication to tubercular lesions elsewhere in the body. When the disease in the uterus is simply a part of a more extended infection, it is probably a minor consideration in the case. If, so far as can be determined, the disease is limited to the uterus, and more particularly to the cervical portion, it is possible, reasoning from what we know of the course of the disease in other parts, that a natural cure might be effected by the usual anti-tubercular remedies.

Such a case as that already referred to and reported by Jordan Lloyd (20), where the cavity of the uterus had become obliterated and contained old cretaceous material, seems to indicate that recovery is possible. It is, however, doubtful whether with the knowledge we now possess of the infective dangers always associated with tubercular foci in other parts of the body, such an end should ever be aimed at, more particularly when we know that removal can effect a perfect cure.

TREATMENT.

Should anything short of removal of the uterus in part or in its entirety be considered ? In other words, should we ever be satisfied with curettage or local applications ? If we could be sure that the disease was localised and superficial it would be right to adopt measures that would retain to the patient parts of such vital importance, and more particularly would this be the case if the patient had not passed the climacteric. But if we may judge from our knowledge of the disease, as studied pathologically, and from the extreme difficulties encountered in knowing to what extent the disease has encroached upon the uterine tissues and upon the adjacent structures, more particularly the Fallopian tubes, there is little doubt that removal is the proper course to pursue. If the disease be limited to the cervix then amputation of this particular part should be carried out. If the body is involved and the cervix free, amputation above that part may be considered sufficient.

The question whether hysterectomy should be executed *per vaginam* or abdominally is one which clinical experience would answer in favour of the latter method. If it were possible to be sure that the Fallopian tubes were free from disease, and therefore that the lesion was purely uterine, vaginal hysterectomy would be quite feasible; but as this important point can rarely be settled with any approach to certainty the abdominal route appears the right one. For, by freely exposing the pelvic cavity, we are able to examine the adnexa, and so settle the question whether they too are implicated and require to be extirpated with the uterus.

Every case has to be considered on its own merits; and when we are face to face with advanced disease in some other

part of the body, more particularly in the lungs, it will be inadvisable to attempt radical measures upon the diseased uterus.   On the other hand, if the operation does not appear prohibitive, from that point of view, the removal of tubercular foci often act beneficially upon other lesions of the body.   It should also be remembered that, although we may expose the affected parts and find that removal would be attended with too many risks, such simple exploratory exposure is sometimes fraught with good affects.

Among efforts that must always be employed, whatever the nature of the case, are local cleansings by douches, etc., and the administration of the usual anti-tubercular remedies.

AUTHORS REFERRED TO.

1. HEGAR.—' Die Enstehung, Diagnose, u. chirurg. Behandlung des genital tuberculose des Weibes,' Stutt., 1886.
2. P. D. TURNER.—'Trans. Obstet. Soc. Lond.,' 1900, vol. xli, p. 359.
3. G. F. STILL.—' Trans. Path. Soc. Lond.,' 1901, vol. lii, p. 139.
4. KIWISCH.—Quoted by Senn (11).
5. C. J. BOND. —' Brit. Med. Journ.,' 1905, vol. ii, p. 233.
6. GÄRTNER. —' Zeitsch. f. Hygiene u. Infectionskrankheiten,' 1893, Bd. xi.
7. HEGAR.—Quoted by Kynoch (21).
8. GLOCKER.—Quoted by Kynoch (21).
9. FERNER.—' Progressive Medicine,' 1903, vol. ii, p. 223.
10. SCHUCHARD.—Ibid.
11. N. SENN.—' Tuberculosis of the Genito-Urinary Organs,' 1897, p. 143.
12. HANSCHKA.—'Centralbl. f. Gynäk.,' 1901, No. 5.
13. NEBESKY.—'Monats. f. Geb. u. Gyn.,' November, 1905.
14. ERIC YOUNG.—' Trans. Obstet. Soc. Lond.,' 1907, vol. xlviii, p. 286.
15. PETER HORROCKS.—Ibid., 1903, vol. xliv, p. 141.
16. PETER HORROCKS.—Ibid., 1900, vol. xli, p. 365.
17. COOPER.—Quoted by Senn (11).
18. JAMES H. TARGETT.—' Brit. Med. Journ.,' 1903, vol. ii, p. 959.
19. J. BLAND-SUTTON.—' Trans. Obstet. Soc. Lond.,' 1906, vol. xlvii, p. 72.
20. JORDAN LLOYD. —' Lancet,' 1899, vol. i, p. 597.
21. J. A. C. KYNOCH.—' Brit. Med. Journ.,' 1903, vol. ii, p. 963.
22. VASSMER.—' Progressive Medicine,' 1903, vol. ii, p. 228.
23. PENROSE AND BEYEA.—' Amer. Journ. of the Med. Sci.,' N.S. cviii, p. 537.
24. E. FRÄNKEL.—' Centralbl. f. Gynäk.,' 1896, No. 39.
25. R. EMANUEL. —' Zeitschr. f. Geburts. u. Gynäk.,' Bd. xxix.
26. HERBERT WILLIAMSON.—'Trans. Obstet. Soc. Lond.,' 1903, vol. xliv, p. 141.
27. OTTO v. FRANQUE.—' Virchow's Jahresbericht,' 1894, Bd. ii, p. 730.

CHAPTER XVII

TUBERCULOSIS OF THE FALLOPIAN TUBES

RECENT investigations have gone far to show that tuberculosis of the Fallopian tubes is a disease of much greater frequency than was at one time supposed. Of the three parts constituting the female genital organs—the uterus, tubes, and ovaries—the tubes are pre-eminently the parts most often invaded. This relative frequency has been established by many series of published statistics. Thus Heilberg (1) records thirty-five cases of tubercular disease of the female genital organs; in twenty-four the tubes were involved, in seventeen the uterus, and in seven the ovaries. Still (2), out of a series of thirteen cases of tubercular disease of the female reproductive organs in children under twelve years of age, found the tubes affected in all, the uterus in eight and the ovaries in one. Brünig (3), in reporting forty-four cases of tuberculosis in children under fifteen years of age, found twenty-nine cases in which the tubes were diseased.

Of more interest, however, is the relative frequency of tubercular disease of the tubes to other affections of these organs; and it is particularly in this respect that recent researches have thrown so much light on the subject. Penrose and Beyea (4) carefully examined all the tubes removed by them, for any form of salpingitis, within a certain period. These are given in two series of twenty-five and twenty-seven. In the first series there were five cases, and in the second four, making nine cases out of fifty-two, or 17·3 per cent. Williams (5), in his investigations, states that 8 per cent. of all Fallopian tubes removed for inflammatory disease are tubercular. Numerous other authors might be quoted to show that since a careful microscopical examination has been conducted of tubes

removed for supposed simple salpingitis, and in some cases suppurative salpingitis, many have proved to be tubercular.

No age appears exempt from the disease. In one of Still's (2) cases the child was only eight and a half months old ; and iu one of Heilberg's (1) cases the woman was sixty-three. The age of election appears to be between twenty and forty—that is, during the child-bearing period.

The invasion may be either primary or secondary. Special interest attaches to the primary form ; and there seems little doubt that the tubes constitute one of those initial foci within the body which may be the means of distributing the disease to other parts, both far and near. Of the relative frequency of these two forms it is hardly possible to speak ; but so far as symptoms are concerned, it is probable that the disease when primary is more likely to give local signs than when secondary, from the fact that disease elsewhere may mask the symptoms in the latter case. Penrose and Beyea (4), in their nine cases, believed six to be primary from the fact that no tubercular lesion could be discovered elsewhere, and that there was no history of any previous tubercular trouble. In respect to children, there is, as indicated by Still (2), considerable difficulty sometimes in determining whether a particular case is primary or secondary. The frequency with which disease of the tubes is associated with tubercular peritonitis leaves it an open question which is the cause and which the effect. Perhaps the only way in which the point can be settled is the supposed relative age of the disease in the affected parts ; and even this differentiation can only be possible in a limited number of cases.

Among some individual illustrations of primary disease may be instanced two cases recorded by Lea (6). In both these cases the probable primary nature of the disease in the tubes was based upon the apparent absence of any existing, or history of a pre-existing, tubercular lesion in the body ; the lack of any evidence of disease in the endometrium ; and that no other cause, such as a septic or gonorrheal infection, was forthcoming.

ÆTIOLOGY.

The way in which the Fallopian tubes become infected, whether primarily or secondarily, is of considerable interest

and importance.   The possible sources of infection may be regarded as four in number :

         (1) From the peritoneum.
         (2) From other internal organs.
         (3) From the blood.
         (4) From without.

(1) That the tubes may be infected as the result of tubercular peritonitis is regarded by many as the most frequent of all sources ; and there is much to support such a contention. Basso (7) by inoculation experiments on rabbits, " favoured the idea of infection at the point of contact (even if no previous lesion exists) with propagation downwards along the line of the passage of the genital secretions." Pinner (8) has also experimentally shown that powdered cinnabar introduced into the abdomen of rabbits and dogs finds its way into the tubes, uterus and vagina ; and tubercle bacilli have been found in the tubes after death from tubercular ulceration of the bowel, even when there was no evidence of salpingitis (Targett). Other facts in support of this view of the source of infection are the frequency with which the tubes are found involved in tubercular peritonitis.   According to statistics given by Osler (9) this association is met with in 30 to 40 per cent. of the cases.   This evidence, however, must make it quite clear, to be of real value, that the peritoneal infection ante-dates that of the tube invasion ; .and this important distinction it is by no means always easy to determine.   Another fact of undoubted frequency is the involvement of the fimbriated extremity, or *ostium abdominale*, as compared with other segments of the tube.   And lastly, there is this somewhat striking feature, that both tubes are frequently attacked similarly, giving the appearance of a common source of infection.

Taking, therefore, into account these various facts, there is much to uphold the view that the Fallopian tubes are at least sometimes, if not indeed often, infected by way of the peritoneum.

(2) As regards the second source of infection—from other internal organs—it is unlikely that such an occurrence is anything more than a pathological curiosity.   There is, however, no reason why a Fallopian tube should not become adherent to a tubercular focus affecting some other organ, and so be directly invaded.   Individual instances of such an accident have been recorded.   Lea (10) has reported a case where the tube became

adherent to a perforating tubercular ulcer of the intestine. Targett (11) relates having met with a case where a right tubercular pyosalpinx was firmly adherent to the cæcum and appendix, in which there was extensive chronic ulceration; the left uterine appendages were normal. Mosler (12) reported two cases in which the fimbriated end of the tube became adherent to the rectum, and through the perforation of a tubercular rectal ulcer was directly invaded.

(3) Infection of the Fallopian tubes by means of the blood can be the only explanation of many of those cases where other foci are known to exist, and the probable cause also of some others in which the lesion is primary. From analogy to the appearance of the disease in other parts, there is very good reason for believing that, given some local cause which impairs the normal vitality of the mucous or submucous lining of the tube, tubercle bacilli will find a nidus in which just as suitably to develop as in any other temporarily damaged tissue. It is this fact that lends such strong support to the view that the Fallopian tubes may prove a very fruitful source for the primary appearance of the disease in a class of patients whose constitution generally, and whose tubes locally, afford suitable opportunities for such invasion. If a catarrh of the air-passages, or of the intestinal canal, be regarded as a predisposing cause for tubercular infection, then with equal reason must such a lesion, involving the mucous channel of the Fallopian tubes, be so considered. Of the frequency with which the Fallopian tubes are subject to inflammatory affections it is not necessary to discuss here; but the mere fact that such is the case is a sufficient reason for assuming that primary infection through the blood is, for all we know, possibly a very frequent means by which tuberculosis gains a primary footing in the human body.

(4) Infection of the Fallopian tubes directly from without appears in certain cases to be undoubted, but in others only to be problematical. As unequivocal illustrations are those cases where the primary focus exists in the uterus and a direct extension can be traced into the tubes, but the question perhaps of most interest is the possible direct conveyance of tubercle bacilli, by some more or less mechanical or physiological means, through the vagina and uterus to the Fallopian tubes. The subject has already been partly discussed when dealing

with the same question in connection with the uterus. Experimental proofs were cited to show, in the first place, that inorganic particles inserted into the vagina could find their way into the tubes; and also that the semen of tubercular guinea-pigs could convey the disease (see page 227). Hence, while it is difficult, with any degree of certainty, to prove such a route for infection to take place in the case of the human being, there seems reason to believe that infection may be carried by means of the semen ; and that tubercular fæces and urine may also be media of transmission. Examinations made with infected hands, and the employment of infected instruments, are usually mentioned as possible sources; but as

Fig. 44.—Tubercular salpingitis. The outer segment of the one tube is sectioned to show its canal filled with caseous material. (London Hospital.)

actual agents, except among the laity themselves, they can hardly be regarded nowadays as worthy of consideration.

PATHOLOGY.

The first most striking feature about tubercular disease of the Fallopian tubes is the frequency with which both are involved. It is the exception to find one tube only diseased. This bilateral association seems to suggest either a natural weakness and disposition on the part of both organs at the same time to become infected, or that a common source of infection, such as the blood or peritoneum, renders each equally exposed and liable to invasion. But while both may be diseased there may be considerable differences in the nature and extent of the lesions involving the one or the other.

Attempts have been made to classify tubercular affections of the Fallopian tubes. Thus Williams (13) differentiates three

types—(1) miliary, (2) chronic diffuse tuberculosis, and (3) chronic fibroid tuberculosis. The miliary form of the disease is usually merely part of a generalised tuberculosis; miliary tubercles are found discretely scattered throughout the mucous lining, giving to it a swollen and somewhat granular appearance. To the naked eye, however, nothing more suggestive than a catarrhal salpingitis is usually presented, and it is only by the aid of the microscope that the true character of the disease can be determined.

The second form of the disease is that which may be said to practically include nearly all the lesions with which we are most familiar in manifestations of the disease in other parts of the body, and the various conditions presented are due, more or less, to the stage at which the disease has reached. As a rule the grosser lesions, if not the whole disease, are found in the outer segment of the tube. What might be considered a typical tubercular Fallopian tube would present some such features as the following : There would be great increase in size and tortuosity of the tube. A not uncommon expression used to designate the shape and dimensions of a badly infected tube is to liken it to a banana, a good example of which is depicted by Targett (11). It is frequently bound down to the floor of Douglas' pouch by more or less firm adhesions; and these may also attach it to the uterus, to the rectum, and to some portion of the large or small bowel above ; sometimes it encircles and obscures the ovary. When the tube is cut into it presents many variable features, but all more or less characteristic of tubercle. Thus, as shown in Figs. 44 and 45, masses of broken-down caseous material fill up the canal. The former illustration is taken from a specimen in the museum of the London Hospital (No. 2109A). It shows the caseous material breaking away from the sides of the tube, which otherwise it fills. Fig. 45 is copied from the illustration in Cone's paper; it shows the right tube and ovary in section, and that more or less localised abscesses have formed. It will be further noticed that the parietes of the tube in Fig. 44 has been so extensively invaded that the outer wall is practically little more than an abscess sac. Fig. 46, which is taken from a specimen in Guy's Hospital Pathological Museum (No. 2251), represents both tubes packed with caseous material, which show in places signs of breaking down. It is interesting to note the absolute

similarity which exists in the disease as it affects each tube. The specimen was removed from a child, and showed also a tubercular condition of the endometrium.

In some cases occlusion of the fimbriated extremity takes place, when the tube may become so distended as to reach anything in size between a walnut and a child's head. Fig. 47, taken from a specimen in the Royal College of Surgeons (No. 4566A) represents the tubes so distended that they formed abscess cavities which could be detected as swellings in the lower part of the abdomen. Here, again, as indicated above

Fig. 45.—Tubercular salpingitis. The right tube and ovary sectioned (the lower two dotted lines indicating the tubercular ovary, the upper line caseous cavities in the tube). l.Ov., left ovary, with dilated tortuous tubercular tube below; M., myoma; F.U., fundus of uterus. (After Cone.)

in Fig. 46, there is a remarkable similarity between the affections of both tubes. This similarity is sometimes more strikingly exhibited by only the outer portions of the tubes being affected, and it constitutes a by no means uncommon type of the disease. There are a couple of specimens in the museum of the Brompton Hospital for Consumption which are very good illustrations of this condition. In one (No. 407), both tubes are tortuous, thickened, and filled with caseous material, but the portions of the tubes butting on the uterus are not involved; it is also noted that the ovaries appear healthy. In the other

specimen (No. 0133, Manuscript Catalogue) both Fallopian tubes are greatly thickened and convoluted. In their outer two thirds they are filled with yellow caseating tubercular material; their inner portions are natural. The uterus has been opened to show the thickened endometrium, and a scraping from this demonstrated the presence of the tubercle bacillus. As the patient, a girl aged fifteen years, died of subacute pulmonary tuberculosis, it looks very much as if this was a case of infection through the blood of the uterus and the tubes, independently, for the normal condition of the proximal ends of the tubes seemed to negative any direct extension, by continuity, between the one or the other. Another type of tubercular tube is that where, instead of the whole or outer portion of the canal being uniformly distended, only segments are involved, so that a somewhat interruptedly nodular condition results.

When, as not infrequently happens, a considerable quantity of pus is present, there is little doubt that a mixed infection exists, and that gonococci or pyogenic microbes have complicated the destructive process, and led to more advanced conditions than could be justly attributed to the tubercle bacillus.

When tubes thus affected are subjected to microscopical examination, confirmatory evidence is obtained by finding either giant cells or the tubercle bacillus. The changes met with vary according to the age of the disease or the stage to which it has advanced. The earlier stages show a swollen condition of the plicæ; and in the submucous tissue may be found the typical giant cells, with often bacilli within them. These latter, however, also exist in the intercellular spaces. In more advanced places the mucous membrane becomes displaced by caseous débris; and the muscular tunic disappears through infiltration with the same material. When complete caseation and necrosis has been reached neither giant cells nor bacilli will be found.

The third variety of the disease described by Williams (5), and termed "chronic fibroid," partakes of the nature of a hyperplastic type. It is distinguished by a thickening and hardening of the parts, so that the tubes present an appearance of considerable enlargement. It would seem to offer some resemblance to that form of hyperplastic stricture of the bowel which is not infrequently met with in ileo-cæcal tuberculosis; and it may be that the same forces are at work as those which were fully described when discussing the subject under that

particular head (see page 125). The case narrated below (Case XXXV) seems to illustrate such a form of the disease. Tubercle bacilli are rarely found, but giant cells of a somewhat atypical but suggestive character are met with.

As pathological lesions dependent upon the primary disease in the tubes are the inflammatory changes evoked in the surrounding tissues; the localised peritonitis set up may result in the formation of very extensive adhesions, and these may be contracted between the parietes, the uterus, ovaries, rectum, large and small bowel. In some cases the attachment becomes so intimate that separation without laceration is

Fig. 46.—Tubercular salpingitis and endometritis.   Both tubes sectioned to show the canal stuffed with caseous material.   (Guy's Hospital.)

impossible. Should mixed infection take place localised collections of pus may result, and either from contact with bowel, or the peculiar nature of the infecting organisms, this pus may be very foetid.

SYMPTOMS.

Uncomplicated tubercular disease of the Fallopian tubes gives rise to very few symptoms of any real pathognomonic value. The frequency with which the condition is associated with more extensive lesions, either in the immediate neighbourhood of the tubes themselves or in more distant parts, renders,

sometimes, the differentiation of symptoms, due to the one or the other, practically impossible. In the earlier stages of infection the symptoms are *nil*, and it is not until the disease has advanced to a considerable extent that local or general manifestations become evident. Derangements of the menstrual function are very variable, for the histories of recorded cases show that in some there is amenorrhœa, in others menorrhagia, metrorrhagia, or dysmenorrhœa. Of these disorders, possibly the last is of most frequent occurrence. Targett (11), in all the cases which he has observed, has noted it, and speaks of it as often being the patient's chief complaint. Pain is also a most variable symptom, being as often absent as present, and when it exists presenting no features of any distinctive value. As bearing out some of these points there is an interesting specimen in the Pathological Museum of King's College (No. 1218), where the Fallopian tubes are shown with their cavities much dilated and lined with caseous material. The patient from whom the parts were removed was aged thirty years, and died of phthisis, with no symptoms during life of uterine disease.

Occasionally there is a discharge from the uterus, and when such is the case it more often indicates that that organ is, or has become, infected itself. The existence of any fever suggests the possibility of mixed infection.

DIAGNOSIS.

With so few distinctive symptoms, the diagnosis of tubercular disease of the Fallopian tubes is a matter of considerable difficulty. Certainty there rarely can be; conjecture is the most that can be arrived at, and that more from indirect than any direct manifestations. Thus, the presence of supposed tubal disease in a virgin, where there is no question of any septic or gonococcal infection, lends considerable weight to the assumption that tuberculosis is at the bottom of the mischief, and still more likely is this suspicion to be correct if a tubercular history is traceable in the patient or her family. The presence of tubercle bacilli in a vaginal discharge, or in the curettings of the uterus, gives confirmation of the nature of the lesion. The detection of infected tubes by means of palpation, either *per vaginam* or through the anterior abdominal parietes,

entirely depends upon the extent to which the disease has advanced. In some well marked examples, where the tubes are enlarged or nodular in outline, their condition can be fairly well detected from the vagina ; it is only when the tubes are distended to the extent shown in Fig. 46 that they will be felt through the abdominal parietes, as happened in the particular case from which the illustration is taken. A specimen also exists in the museum of Charing Cross Hospital (No. 1627), where each tube was the size of a small fist. A swelling could

FIG. 47.—Tubercular salpingitis. Both tubes present the appearance of abscess cavities. (Royal College of Surgeons.)

be felt in the groin, and this at the operation proved to be the distended right tube, which lay over the left, the latter being situated behind the uterus in Douglas' pouch. Pressure may cause pain, whether applied from above or below, but this may equally, if not more likely, indicate involvement of the peritoneum. Senn (15) regards the systematic employment of the thermometer as of considerable diagnostic value. A slight rise in the evening with a normal or subnormal morning temperature, he considers very strongly in favour of the tubercular nature of the affection.

That mistakes are often likely to be made is only natural in

a disease so indistinctive in its symptoms. In a case recorded by Targett (11) it was mistaken for acute appendicitis, and treated as such. In quite a number of cases the tubes have been removed for supposed catarrhal, or some form of septic, salpingitis, and the microscope has finally revealed the true tubercular nature of the lesion.

PROGNOSIS.

There can be little doubt of the seriousness, in every way, of tubercular disease of the Fallopian tubes. In the first place, assuming the most favourable course which the disease can pursue, it must almost certainly leave the tubes obliterated by adhesions, and, therefore, useless so far as their normal function is concerned—in other words the patient is doomed to sterility. Mayo (16), in recording some of his experiences in the removal of tubercular tubes, remarks that he occasionally found a tube on one side converted into scar tissue, with complete obliteration of the mucous membrane, cured by natural processes; while on the other side active disease was present, thus showing that while healing may take place, it is at the expense of the total loss of function. It is, however, with the progress of the disease that we have in the majority of cases to deal. Tubercular disease in the Fallopian tubes is no exception to the dangers incumbent upon the existence of the disease elsewhere. Both near and distant infection may take place.

As a cause of tubercular peritonitis there seems no doubt, and Mayo (16) considers that it explains the greater frequency of tubercular peritonitis in females, especially between the ages of twenty and forty. More serious, however, is the development of disease elsewhere. Steven (17) reports two cases, in which the disease appeared to be primary in the tubes, and where in each case the patient died of tubercular meningitis. Turner (18) records the case of a girl, aged twenty years, who died of compression of the cervical cord, the result of caries of the axis ; no other evidences of tubercular disease were found in the body except in the pelvis, where the uterus, ovaries, and tubes were the seat of advanced tubercular disease. From the apparent greater age of the lesions in the genital organs, the author concluded that these were primary and the vertebral secondary.

That removal of the tube holds out the possibility of a permanent cure seems well established by Mayo's (16) statistics. Out of twenty-six radical tube operations on cases of tubercular peritonitis, twenty-five recovered ; of these, seven had been operated upon by simple laparotomy from one to four times previously—" In not a single patient, as yet, has another operation become necessary."

<p style="text-align:center">TREATMENT.</p>

It is doubtful whether any other means should be considered than those which have their aim in the entire removal of the disease by operation. While it may undergo, as indicated above, a natural cure, there are so many other considerations of a serious nature which render it inadvisable to exercise undue delay. It may not be possible to remove the disease when exposed, but simple exposure in itself, as will be presently shown, is often of considerable value.

When an abscess has formed of sufficient size to be detected *per vaginam*, it has been opened and drained through this region. Except where the abscess is largely the result of mixed infection, and occupies a considerable space in the pelvic cavity, it is doubtful whether much more than temporary benefit is derived. The sinus which follows is apt to take on a tubercular action, and if it was not septic before, there is a greater risk of it becoming so through the unprotected vaginal canal. The case narrated below (Case XXXVI) is a good example of the doubtful value of such a method of treatment, for the patient remained ill and the sinus continued to discharge as the result of opening and scraping the cavity some weeks before the radical operation for the removal of the appendages. A matter of no small moment to consider in proposing excision is the removal or not at the same time of the uterus. In discussing the pathology of the disease it has been shown how frequently tuberculosis extends from the tubes into the uterus. Kynoch (19) refers to a case where, after the removal of a tubercular Fallopian tube, a slight subsequent uterine hæmorrhage took place and led to a currettage, which revealed the presence of early tubercular endometritis. The uterus had as a result to be removed by a second operation. He is therefore of opinion that in cases of suspected tubercular salpingitis the endometrium should also be carefully examined. Doran (20),

in operating on a case, records how an abscess formed about the stump of an amputated tube which ultimately caused the death of the patient.   As the result of this experience he, too, questions whether it would not be better to remove the uterus with the tubes, or else to trust entirely to medication.   The wisdom of such advice would seem to be still further confirmed by a case described and illustrated by Turner.   In this case, to have simply amputated the tubes at their junction with the uterus would have been to have left two distinct tubercular foci in the intra-uterine portions of the Fallopian canals. There is quite sufficient, therefore, both pathologically and clinically, to render it a matter worthy of serious consideration whether, where the removal of the tubes and ovaries is con- sidered imperative, the uterus should not be taken away also. In certain cases, as, for instance, in that narrated below, it is the simplest and probably the safest procedure to pursue, for where the adhesions are great it may entail less troublesome and time-taking separation to perform panhysterectomy than to execute double salpingectomy and oöphorectomy.

The cases where the simple removal of the tubes might be considered sufficient are those in which the outer segments of the tube appear to be alone involved in the disease, and where they can be comparatively easily separated from the surround- ing structures.   On the other hand, should the whole length of the tube be involved in the disease it should, I think, be considered the proper procedure to remove the uterus, and that in spite of the absence of any previously discoverable indica- tions of endometritis.

The last consideration concerns what ought to be done when, after opening the abdomen, removal of the affected parts appears impossible.   Experience seems to teach that more is to be hoped for by conservative measures than by extensive attempts at extirpation.   Any intra-abdominal operation which involves considerable separation of adhesions from neighbouring structures is always fraught with grave risks.   If the patient is not killed by shock, the effect of a long and severe operation, she may die sooner or later from peritonitis or other form of septic poisoning.   Roberts' (21) case is a very good example of the extreme difficulties which may be encountered in some of these advanced cases.   The parts were so intimately matted together that it was almost

impossible to define the fundus of the uterus. One tube was so rotten that in attempting to remove it it tore in several places, and the wound area became flooded with cheesy fœtid pus ; portions of one ovary had to be left behind owing to its intimate attachment to the intestine. As the author remarks, the operation was a very severe one, and the patient suffered much from shock, from which she never rallied, and from which she died thirty-six hours after.

On the other hand, there is reason for some hope, no matter how grave the appearances, by the performance of what is little more than an exploratory operation. This is well represented in a case recorded by Marcy (22). The patient was a young woman aged twenty-seven years, who for some months had suffered from anæmia, loss of flesh, slight abdominal distension from fluid, and pelvic pain preceded by irregular and painful menstruation. The diagnosis of enlargement of the Fallopian tubes with fixation of the uterus and pelvic tenderness was easily made. Laparotomy was performed for the purpose of removing the appendages. On opening the abdomen miliary tubercles thickly studded the peritoneum, both parietal and visceral. Very considerable masses existed in the pelvis. The fluid was sponged out and the abdomen closed. Convalescence was easy and rapid, and when heard of two years after she was in fair health. In a case reported by Swayne (23) the patient had a large mass in the pelvis and much distension of the abdomen, which contained fluid. On opening the abdomen the whole of the peritoneum was studded with what, to the naked eye, was apparently miliary tubercles. The appendages were embedded in exudation, which formed the mass felt in the pelvis. The peritoneal cavity was full of ascitic fluid. As the removal of the appendages was considered impossible the wound was closed, after flushing the peritoneal cavity with a hot saturated solution of boracic acid. The patient made a good recovery, and at the end of a month had put on several pounds in weight. Whether " stuffing " or drainage should be used will depend much upon the nature of the lesions exposed and the way they have been dealt with. The best results are always obtained when it is possible to do without either. But if abscesses have been opened, and more particularly if there exists mixed infection, and if in the separation of adhesions there is any fear that the intestine has been damaged, both

drainage and " stuffing " should be employed. In many cases it will be found better to drain through the vagina by an opening made into it from behind the uterus than by way of the abdominal incision.

The advisability of operation is sometimes questioned in the presence of pulmonary disease. It seems, however, that where phthisis is not advanced the total removal of the pelvic foci proves advantageous rather than otherwise.

It need hardly be said that every effort must be put forth to combat the disease on the conventional anti-tubercular lines, and that, whatever the local measures employed, the patient's general health should be attended to with as much assiduity as if treatment were exclusively adopted for pulmonary tuberculosis.

CASE XXXV. *Tubercular salpingitis (hyperplastic); uterine retroflexion; cervical fibroid; laparotomy; double salpingectomy and right oöphorectomy; recovery.*

The patient was a maiden lady aged thirty-five years. When a child she had suffered from peritonitis; but beyond general delicacy she had been fairly well up to a year before coming under observation, when she commenced to be troubled with diarrhœa and dysmenorrhœa. Since that time the diarrhœa had continued, the bowels moving from four to seven times a day. The motions were usually loose, light in colour, and very offensive; there was no blood or mucus. There was a purulent discharge from the uterus, and an occasional intermenstrual red discharge. She suffered severe pain on the first day of menstruation, felt mostly in the back, and when lying more than when walking. She had lost flesh and strength. There was no possible reason for entertaining any question of venereal or other septic form of infection.

On examination of the patient, after admission into a Private Nursing Home, under an anæsthetic the uterus was felt to be retroflexed, and on its posterior wall a tumour was felt about the size of a walnut. To the left of the fundus another tumour could be detected somewhat larger. The uterine sound passed for three inches, and caused very free bleeding. The uterus was then curetted, and the curettings examined microscopically, but nothing further than what suggested a simple chronic endometritis was found.

Subsequently the abdomen was opened. Both tubes were found greatly distended and tortuous, each about the diameter of a hen's egg. They were fixed deeply in Douglas' pouch, and were with difficulty separated from the posterior wall of the uterus. The latter

was enlarged and retroflexed, and had a fibroid about the size of a walnut attached to the posterior wall of the cervix. The left tube was removed, but the ovary left, but both tube and ovary were excised on the right side ; on this side there were more troublesome adhesions, and connections with the bowel and pelvic wall had to be severed. The fibroid was not touched, but the uterus was ventrofixed.

Dr. John Anderson examined the specimens removed and reported : " The ovary is enlarged and shows early cystic changes ; fibrous on section, with indications of being attached by adhesions to neighbouring parts. The tubes are dilated and show a hypertrophic character of their walls, while the mucous coat is in places atrophic. The microscopical examination shows the ovary to be in a condition of chronic inflammation (chronic ovaritis with fibrosis), and in one part the appearances suggest a tubercular character of the lesion, several ill-defined giant cells being recognised. The microscopical examination of the tubes shows thickening of their walls with atrophy of the mucosa in parts and a proliferous character in others."

While the evidences in this case, from a diagnostic point of view, cannot be said to be absolutely positive in favour of tuberculosis — for the bacillus was not found, nor was the existence of tubercles unequivocal—nevertheless, the whole history seemed to point, not only to a tubercular lesion in the genital organs, but very possibly to a similar lesion in the intestine. The case was treated some time ago, and with the knowledge and experience we now have I have little doubt that the course I should have pursued would have been to perform a panhysterectomy, and so not only rid the patient of the possible existence of tubercular disease in the uterus, but free her also of the cervical fibroid. As a further indication that this would probably have been the correct procedure, I may state that two and a half years later I heard that she was abroad under the treatment of a well-known continental gynæcologist, quite probably from a return, or more correctly a continuation, of the disease in those parts which were left behind at the original operation.

The presence of a uterine fibroid in association with genital tuberculosis is of some interest. It may be merely an accidental connection, but it has been noted in other cases. A comparatively large one, with smaller ones, existed in the case so fully reported by Cone, and from which Fig. 44 was taken. The large fibroid is shown depicted in the original illustration, but it has been omitted in the copy.

CASE XXXVI. *Tubercular salpingitis; pelvic abscess; extensive matting of parts; panhysterectomy; recovery.*

Mrs. McK—, aged twenty-six years, was admitted to the Victoria Infirmary in July, 1905. She commenced to menstruate at the age of thirteen years, and was regular and normal until her marriage at the age of twenty-four. From this time onwards menstruation appeared to be too frequent, very scanty, the discharge dark and clotted, and accompanied by a great deal of pain. The pain she described as sharp and shooting in character. She stated that in March preceding when doing some heavy work, a very severe pain came on in the right side and down the right leg. From that time onwards she had never been well. She was taken into another hospital prior to admission into the Victoria, where she was treated for an abscess situated in Douglas' pouch. According to the report received, the treatment adopted at this time was incision of the abscess through the vaginal wall. A large quantity of fluid escaped, which was clear in character. On the following day pus began to come away. It was drained for three weeks, but on removal of the tube re-accumulation took place. The cavity had, therefore, to be re-opened; on this occasion the lining wall of the abscess was scraped, and the tissue, when examined microscopically, revealed the presence of the tubercle bacillus. On admission to the Victoria Infirmary an examination of the pelvis showed pus coming from the vaginal vault behind the cervix. In the right fornix a hard, partly rounded swelling was felt pushing the uterus over to the left. It was fixed, and the whole pelvic contents felt firmly matted together. She was kept under observation for a couple of weeks, during which time her temperature often reached 101° F. The discharge from the vaginal sinus showed no signs of stopping.

On opening the abdomen a mass was felt in the right pelvic fossa; adhesions were abundant in all directions. The left ovary was enlarged and cystic, and the end of the left tube expanded to the size of a walnut. The appendix vermiformis, which passed over the brim of the pelvis, was embedded in the mass below. The intimate involvement of all parts appeared to render it expedient to remove the uterus together with the adnexa. In doing this a pocket of very fœtid pus was opened into. The operation was completed by packing the pelvis with iodoform gauze and the insertion of rubber drainage tubes, which were conducted out through both the abdominal wound and through the vagina. The patient made a good recovery.

The mixed infection which evidently existed in this case, as shown by the fœtid abscess, probably proved that, severe as was the radical operation of total extirpation, it was the only

measure which held out any hope of permanent relief to the patient.

AUTHORS REFERRED TO.

1. HEILBERG.—' Internat. Beiträge z. wiss. Med.,' 1891, vol. ii; also Epitome, ' Brit. Med. Journ.,' 1892, vol. i, p. 38.
2. G. F. STILL.—' Trans. Path. Soc. Lond.,' 1901, vol. lii, p. 140.
3. BRÜNIG.—' Monats. f. Geb. u. Gyn.,' Band xvi, Heft 2.
4. PENROSE AND BEYEA.—' Amer. Journ. of the Med. Sci.,' 1894, vol. cviii, p. 521; also vol. cix, p. 271.
5. J. W. WILLIAMS.—' Johns Hopkins Hospital Reports,' 1903, vol. iii.
6. ARNOLD W. W. LEA.—' Trans. Obstet. Soc. Lond.,' 1904, vol. xlv, p. 133.
7. BASSO.—' Brit. Med. Journ.,' 1905, vol. i, p. 1107.
8. PINNER.—Quoted by Senn (15).
9. WM. OSLER.—' Johns Hopkins Hospital Reports,' 1890, vol. ii.
10. ARNOLD W. W. LEA.—' Medical Chronicle,' 1897, vol. vii, p. 30.
11. JAMES H. TARGETT.—' Brit. Med. Journ.,' 1893, vol. ii. p. 959.
12. MOSLER.—Quoted by Senn (15).
13. J. W. WILLIAMS.—' Johns Hopkins Hospital Reports,' vol. iii, Nos. 1, 2, and 3.
14. CLARIBEL CONE.—' Bull. of the Johns Hopkins Hospital Reports,' 1897, vol. viii, p. 94.
15. N. SENN.—' Tuberculosis of the Genito-Urinary Organs,' 1897, p. 167.
16. WM. J. MAYO.—' Journ. of the Amer. Med. Assoc.,' 1905, vol. xliv, p. 1157.
17. J. LINDSAY STEVEN.—' Trans. of the Glasgow Path. and Clin. Soc.,' 1891, vol. iv, p. 12.
18. P. D. TURNER.—' Trans. Obstet. Soc. Lond.,' 1900, vol. xli, p. 344.
19. J. A. C. KYNOCH.—' Brit. Med. Journ.,' 1903, vol. ii, p. 969.
20. ALBAN DORAN.—' Trans. Obstet. Soc. Lond.,' 1903, vol. xliv, p. 136.
21. C. H. ROBERTS.—Ibid., 1904, vol. xlv, p. 92.
22. HENRY O. MARCY.—' Annals of Surgery,' 1905, vol. xlii, p. 755.
23. WALTER SWAYNE.—' Trans. Obstet. Soc. Lond.,' 1904, vol. xlv, p. 97.

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CHAPTER XVIII

TUBERCULOSIS OF THE OVARY

INVASION of the ovary by the tubercle bacillus has been a subject more of consideration with the pathologist than with the clinician; and the question around which most discussion has waged has been the possibility or not of a primary infection of the organ. That the ovary is often the seat of tubercular disease is sufficiently attested to, both by *post-mortem* examinations and by operation, but the frequency with which such disease is associated with similar lesions in the Fallopian tubes or peritoneum opens up the question as to whether the ovarian lesion may not be, in certain instances, the cause, rather than the consequence, of these extra-ovarian affections.

Of the three reproductive organs—the uterus, the Fallopian tubes, and the ovaries—the last are by far the least often invaded. Statistics have already been given of the relative frequency of infection of these organs, and need not be repeated here (see p. 225).

ÆTIOLOGY.

The channels by which the ovaries may become infected are the blood and direct continuity with neighbouring tubercular disease. There is little doubt that both these sources are exercised. Where the patient is suffering from a tubercular lesion in other parts, or from a general miliary tuberculosis, the ovary becomes simply a link, as any other organ, in the chain of the disease. Such a case, for instance, as that recorded by Brodie (1), where the spleen, mesenteric glands, peritoneum, omentum, all showed cheesy foci, and the intestines were ulcerated, sufficiently illustrates the association. It is quite possible, and indeed, probable, that certain conditions of the ovary predispose to infection, for, as with other parts, anything that weakens the normal resisting powers of the ovarian

tissues must prepare them for the lodgment and development of the tubercle bacillus. From this point of view Senn (2) regards the rupture of a Graafian follicle as a possible predisposing cause, and in support of this opinion may be instanced one of Orthmann's cases, where there was distinct tuberculosis of the yellow substance in the corpus luteum.

We know too little of inflammatory affections of the ovaries to state which, if any, are likely to render them prone to attack, but the fact that they can become so extensively involved by contact with other diseased parts shows the possibility of preparatory changes of some kind. That they may, on the other hand, present some resistance to infection seems borne out by some experiments by Shöttländer (3) who artificially inoculated rabbits with the tubercle bacillus and found that the ovaries were slow in becoming infected. But by these same experiments he was enabled to show that in some cases the ovaries were primarily involved.

Notwithstanding however much we may reason from analogy and experiment, there remain the pathological and clinical facts that at present we are without any established data for accepting the theory of primary disease of these organs. Both Shöttländer (3) and Orthmann (4) alike deny the existence of primary disease in the human subject. The latter in investigating forty-eight cases of pure ovarian tuberculosis, found that in twenty-six the infection was traced from the Fallopian tubes and in twenty-two from the peritoneum. Rosenstein (5) expresses the opinion, based on a careful examination of seven cases of genital tuberculosis in women and on an extensive investigation into the literature of the subject, that there is not sufficient evidence that tubercle is ever solely confined to the ovary, the disease when affecting that organ being nearly always found associated with tubercular salpingitis, or peritonitis. The contention by all authorities is that where a careful and exhaustive examination is made any supposed case of primary disease will be discovered to be secondary; in other words, that the lesion in the ovary will not be the sole one, and that it will be found to present less advanced characters than the disease elsewhere. The truth of this opinion is rather strikingly illustrated in a case published by Gemmell (6) as one of " Primary Disease of the Ovary." In the description given it is stated that " the left ovary was caseous and disorganised,

the tube contained a plug of calcareous material, and its fimbriated end was closed"; that is to say, the evidences were in favour of the tubal mischief ante-dating the ovarian, or in other words, the disease had probably been primary in the Fallopian tube and secondary in the ovary.

As regards the age of patients infected, the disease has been found in children, but as in the case of genital tuberculosis generally, it is commonest in women during the child-bearing period of life, that is, between twenty and forty.

It is a striking fact, which has also been noticed in the case of the Fallopian tube, that both ovaries are frequently at the same time the seat of the disease. Out of Orthmann's (4) forty-eight cases twenty-seven were bilateral. In three cases recorded by Wolff (7) both ovaries in each case were involved, and in these cases it is pointed out that there existed tubercular peritonitis as well; from the fact also that the disease in the ovaries was only incipient, the conditions were considered secondary.

PATHOLOGY.

Until the microscope came to be more systematically used in the examination of diseased ovaries, a proper appreciation of the tubercular lesions affecting them was not possible, for it had been shown that the naked eye fails to detect disease in its early stages, and that for some time only such specimens as presented well-marked caseous changes within the substance of the organ were spoken of as tubercular. In this way Wolff (7) considers that many cases of ovarian tuberculosis have been overlooked, and, therefore, the disease is much commoner than is usually supposed. In seventeen *post-mortems* which Wolff made upon women who had died of tubercular disease, in three ovarian tuberculosis was detected by the aid of the microscope, although to the naked eye nothing abnormal was observed.

The disease as it affects the ovaries may be considered as presenting three more or less distinct types. There is first the deposit of tubercles on the outer surface, the production of a so-called peri-oöphoritis. These miliary tubercles are often the primary extension of the disease from the affected Fallopian tubes, or from a tubercular peritonitis. They cause the organ

to present no distinctive features beyond such characters as are common to the same affection when involving other parts. In the second type the stroma or body of the ovary is invaded with miliary tubercles. This is doubtless simply the early stage of those later characteristic changes which constitute the more commonly recognised form of the disease. The ovary under these conditions may present no marked macroscopical appearances, and it is only by the aid of the microscope that the specific lesions are discovered.

The third type is that where the ovary presents the various marked naked-eye appearances with which we are familiar in other parts of the body. There is caseation with breaking down of the tissues of the organ into *débris* and semi-purulent material. The ovaries under these conditions may present very varied aspects. Thus, for instance, in Fig. 46 they are seen in section as solid masses. But while the whole organ may be converted into practically a mass of caseating *débris*, it is often possible to differentiate separate foci and, indeed, in some specimens these foci are quite isolated, and form discrete collections with fairly healthy ovarian tissue inter-vening. As often as not in advanced involvement of the ovaries they are intimately bound up in the disease of the tubes, and with them constitute a mass adherent to the surrounding parts. Again, the ovary sometimes assists, together with other neighbouring tissues, in constituting the boundary wall of an abscess, which may be the result of a tubercular process in the ovary itself, or, as is more often the case, is the consequence of advanced disease in the tubes. In not a few of these cases the infection is mixed, and the pus, therefore, the result of a septic as well as a tubercular infection.

Not a few cases have been recorded of tuberculosis of ovarian cysts. Whether or not the disease has preceded the formation of the cyst it is sometimes impossible to say. But, in such a case as that recorded by Sänger (8), the cyst had become infected with tubercular material by repeated tappings through an abdomen which was the seat of a tubercular peritonitis. In a case reported by Baumgarten (9), of a girl, aged fourteen years, it also seemed probable that the cyst-wall was infected through the peritoneum, as the patient was at the time suffering from tubercular peritonitis. In one of Pollesson and Violet's (10) two cases, the patient, a woman, aged twenty-five years, had

suffered, when fourteen years old, from what was considered abdominal tuberculosis. The tumour when removed was found to be a cyst of the right ovary with caseating tubercular masses on its inner surface. In this case, therefore, there seems some reason for believing that the ovary was tubercular before the development of the cyst. These same authors collected some sixteen other cases of tubercular ovarian cysts. Spencer Wells (11) reported a case, and his, like so many others, showed the tubercular process to be seated mostly in the parietes of the cyst. In only one case, that of Madlener (12), does it seem to be definitely stated that the cyst, which was about the size of a man's head, contained tubercular matter. It may, however, have been that some of the caseous material from the lining wall had found its way into the general cyst contents, and not that there was a more direct association of the tubercular process with the formation of the cyst. That infection of the cyst may take place through the blood is, of course, quite possible in cases where tubercular lesions are already extant in other parts of the body.

Symptoms and Diagnosis.

It need hardly be said that much too little is known about tubercular disease of the ovaries to admit of any discussion of the subject of symptoms and diagnosis, certainly so far as any possible primary or exclusive involvement of these organs is concerned. But, given a case in which we believe that there is tubercular salpingitis, it is not unreasonable to suppose that there will be more disturbance, both locally and generally, if the disease has extended to, and seriously implicated, the ovaries. The case narrated below is somewhat striking in this respect. From the examination of the parts after removal it would almost seem as if the case might be regarded as one in which the chief, if not actually the primary lesions, existed in the ovaries, and that the tubes became secondarily affected. But, be this as it may, the local manifestations of pain, etc., and the general constitutional disturbance, seemed much more marked than in those cases where the tubes are mainly affected and the ovaries only slightly, or not at all. Bourceret (13) asserts that patients suffering from tubercular ovaritis are frequently hysterical.

TREATMENT.

It is doubtful whether any other treatment should be considered than that of total removal of the affected organ. But the question may sometimes arise whether, in the event of the disease being *apparently* limited to one organ, the other should be left. The impossibility of determining by the aid solely of the naked eye whether the assumed unaffected ovary is really non-infected, and the fact that where one ovary is definitely involved the other is, in most instances, also implicated, renders it advisable to remove both organs. There would probably be no hesitation in pursuing such a line in patients nearing, or passed, the climacteric. But considering the many risks that are run in leaving an infected ovary behind, it is doubtful whether these are sufficiently compensated for by any objections arising out of the premature induction of the climacteric, or in the production of certain sterility in patients during the child-bearing period of life. Increasing experience seems to teach that where the tubes are extensively involved the ovaries rarely escape, and that inasmuch as the uterus, under such circumstances, is likely to be similarly invaded, the wisest and safest course to pursue is to make a clean sweep of the whole reproductive organs.

CASE XXXVII. *Tubercular ovaritis and salpingitis; laparotomy; extensive adhesions; double salpingectomy and oöphorectomy; recovery.*

B. C—, aged nineteen years, was admitted to the Victoria Infirmary in February, 1905. She commenced to menstruate when fifteen years of age, but had never been regular, and the periods varied from intervals of two weeks to three months. Dysmenorrhœa was at one time complained of, and there was amenorrhœa for a period of eleven months; during this time she suffered from leucorrhœa. Her symptoms commenced about three months before admission, and consisted of gradually increasing pain in the left iliac region. This pain was of a more or less constant, dull, aching character.

On admission the patient was noticed to be pale, and suffered from breathlessness, headache, constipation, amenorrhœa, flatulence, and sickness after food. There was some frequency of micturition coupled with slight dysuria. The abdomen presented no marked features, except that tenderness was elicited by pressure in the left ovarian region. Examination *per vaginam* under an anæsthetic revealed

fixation and ante-version of the uterus and enlargement and hardness of both tubes.

On opening the abdomen both tubes and ovaries were found matted to the uterus posteriorly and to the bottom of Douglas' pouch. It was with some difficulty that the adhesions were broken down, and the adnexa sufficiently freed to be removed. As both tubes were found much thickened and enlarged in the cornua of the uterus, V-shaped pieces were cut out of the latter. Douglas' pouch was drained by a tube, and iodoform gauze conducted out through the vagina. At the end of about four weeks the patient left the hospital very well.

Dr. John Anderson examined the parts removed and reported: "Both tubes were found much hypertrophied, tortuous, and bound down by adhesions to the ovaries. The lumena of both were stenosed. In one of the tubes areas of caseation were found, but in the other the appearances were those of fibrosis and congestion. A median section through both ovaries showed an almost complete conversion of the ovarian tissue into caseous-like material. Microscopical examination showed the lumena of the tubes to be filled with tubercular granulation tissue (epithelial cells and giant cells), and desquamated products from the tube wall. The ovaries showed fibrosis with the presence of giant-cells." ·

AUTHORS REFERRED TO.

1. R. C. BRODIE.—'Glasgow Med. Journ.,' 1892, vol. xxxviii, p. 420.
2. N. SENN.—'Tuberculosis of the Genito-Urinary Organs,' 1897, p. 176.
3. SHÖTTLÄNDER.—'Ueber Eierstocks Tuberculose,' Jena, 1897.
4. ORTHMANN.—'Centralbl. f. Gyn.,' 1896, No. 22.
5. ROSENSTEIN.—'Monats. f. Geb. u. Gyn.,' 1904, September and October.
6. J. E. GEMMELL.—'Brit. Med. Journ.,' 1902, vol. ii, p. 1631.
7. WOLFF.—'Archiv f. Gyn.,' vol. lii.
8. SÄNGER.—Quoted by Senn (2).
9. BAUMGARTEN.—'Virchow's Archiv,' Bd. cxvii, Heft 1.
10. POLLESSON AND VIOLET.—'Ann. de Gyn. et d'Obstet.,' 1905, October.
11. SPENCER WELLS.—'Trans. Path. Soc. Lond.,' 1864, vol. xv, p. 175.
12. MADLENER.—'Centralbl. f. Gyn.,' 1894, June 2nd.
13. BOURCERET.—Quoted by Senn (2).

OTHER REFERENCES TO THE SUBJECT OF GENITAL TUBERCULOSIS IN WOMEN.

T. S. CULLEN.—'Johns Hopkins Hospital Reports,' vol. iv, Nos. 7 and 8.
HARTZ.—'Monats. f. Geb. u. Gyn.,' Bd. xvi, Heft 3.   (Contains a comprehensive and exhaustive review of the literature of the subject.)
FEIS.—Ibid., 1897, March.
W. J. SINCLAIR.—'Medical Chronicle,' 1897, vol. vii, p. 273.
AMANN.—'Centralbl. f. Gyn.,' 1902, No. 45.
SPAETH.—'Genital Tuberculose beim Weibe,' Strassburg, 1885.
SELLHEIM.—'Centralbl. f. Gyn.,' 1902.

AHLEFELDER.—' Monats. f. Geb. u. Gyn.,' Bd. xvi, Heft 3.

LEBERT.—'Archiv f. Gyn.,' Bd. iv, S. 457.

GEHLE.—' Virchow's Jahresbericht,' 1881, vol. ii, p. 535.

GEIL.—' Ueber die Tuberculose der weiblichen Geschlechts-organe,' Erlangen, 1851.

SCHRAMM.—' Archiv f. Gyn.,' Bd. xix, p. 416.

WERTH.—' Centralbl. f. Gyn.,' 1890, July 30th.

P. MAAS.—' Ueber die Tuberculose der weiblichen Genitalien im Kindersalter,' Bonn, 1896.

WIEDOW.—' Centralbl. f. Gyn.,' 1885, No. 36.

ZWEIFEL.—' Wiener klin. Wochenschr.,' 1892, Nos 5 and 6.

B. WOLFF.—' Ueber Tuberculose des Eierstockes,' Frankfurt-a-M., 1896.

CHAPTER XIX

TUBERCULOSIS OF THE PERITONEUM (TUBERCULAR PERITONITIS)

No subject within the scope of what is termed "abdominal tuberculosis" has given rise to more discussion than tuberculosis of the peritoneum. To begin with, the name itself has been a matter for dispute. By some it is spoken of as "tuberculous peritonitis"; by others, and the majority, it is designated "tubercular peritonitis." By others again, exception is taken to the word "peritonitis," "tuberculosis of the peritoneum" being regarded as more strictly correct. I do not, however, intend to waste time over the mere question of nomenclature, for in comparison with the many more important points for consideration it is a matter of minor significance. "Tuberculosis of the peritoneum" is unquestionably right, but "tubercular peritonitis" is by common consent the term usually employed.

There is but little doubt that, as pointed out in an earlier chapter, the term "abdominal tuberculosis" has been, and indeed is often now, used as synonymous with "tubercular peritonitis." But all that has so far been said must be regarded as useless if it has not gone clearly to prove the fallacy of confusing such expressions. The term "abdominal tuberculosis" is generic, while that of "tubercular peritonitis" is specific.

Much of the confusion of the past has arisen out of the fact that too little regard has been had for the various causes upon which the predominating involvement of the peritoneum was dependent. The unmistakable evidence of peritoneal infection has been too frequently accepted as something in itself to be regarded as a condition exclusive of other considerations. But the more these "other considerations" are taken into account the clearer it becomes evident that a vast amount of the conflicting opinions one finds given expression to in the literature upon the subject are the result of an imperfect appreciation

of the innumerable complexities that encumber it.   Statistics
are proverbially unsound by reason of the variable conclusions
of which they so frequently admit.   And in no subject does
this seem to be more truly the case than in that under dis-
cussion. Ætiology, pathology, and amenability to treatment all
introduce factors of so intensely variable a character that no
two cases can ever be regarded as similar, and when we take
into consideration the peculiar generalising influence of tuber-
culosis with the uncertainties connected with all so-called con-
stitutional diseases, we have some just conception of the
intricate problems associated with any attempt to statisticise.
These remarks apply more particularly to questions connected
with treatment, but they nevertheless have their bearing upon
the less important considerations of symptoms and prognosis.
While, however, statistics may sometimes be of little worth in
respect to the admission of certain definite conclusions, they are
often valuable as demonstrating the relative frequency of parti-
cular pathological lesions.   Thus, in such questions as concern
the sex and age of infected patients and the primary causes of
disease, much useful knowledge is obtained by the examination
of large series of cases.

In considering first the incidence of sex, it appears that
with children there is nothing to indicate any very marked sex
proclivity, but among adults women rank first.   For some time
before the advent of abdominal surgery men were regarded as
most frequently attacked, and this greater frequency was based
on *post-mortem* investigations, so that all the earlier statistics
show a marked bias in favour of the male sex.   Since,
however, the rise of abdominal surgery, and more parti-
cularly since tubercular peritonitis has come to be treated in
certain of its phases by abdominal section, it has become clear
that the disease is commoner in women than in men.   Mayo (1),
in giving his operative experience, states the ratio as 4
females to 1 male, attributing the greater frequency in the
former sex entirely to primary infection of the Fallopian tubes.
In sixteen cases operated upon in three and a half months by
the brothers Mayo, eleven were in women, in nine of whom the
origin was tuberculosis of the Fallopian tubes.

No aspect of the subject has probably undergone greater
change in recent years than that which concerns the possible
primary origin of the disease.   As already indicated tuber-

cular peritonitis was regarded in the majority of instances as a disease of itself, but now the evidences are all in the opposite direction, and such a study as that involved in the preceding chapters of this work could hardly of itself admit of any other conclusion than that primary tuberculosis of the peritoneum must be, comparatively speaking, a rare disease. What with the searching examination allowed by abdominal surgery and the more exact pathological investigations which recently awakened interest in tuberculosis generally has involved, many cases, which would in earlier days have been regarded as primary, have now been shown to be unquestionably secondary. The truth of this statement may be verified by a few references. Thus, Borschke (2) found out of 226 cases, in which at the *post-mortem* tubercular peritonitis was present, only two where it seemed probable that the disease in the peritoneum was primary. In the large proportion of the cases the infection arose from the bronchial glands, lungs and pleura. Fisher (3) records a case to show how easily the disease might be mistaken for a primary infection, if a most searching investigation were not carried out. In the case he brings forward, the only tuberculous focus which was discovered was a solitary caseous lymphatic gland lying hidden in one of the lungs.

As regards very young children the disease is usually found to be part of a general miliary tuberculosis, Rotch (4) giving it as his opinion that in the first year of life tubercular peritonitis is almost invariably a part of a generalised infection. In women there is no doubt that many cases considered at one time to be primary were in all probability secondary to disease in the genital organs. Mayo (1), whose experience has been considerable in this department, concludes an address on the subject of tubercular peritonitis by saying: " It seems reasonable to suppose that tubercular peritonitis has its origin in a local focus in practically every case." On the other hand, it must be conceded that there is nothing against the *possibility* of primary infection of this membrane, as will be shown when dealing with the subject of ætiology.

ÆTIOLOGY.

Infection of the peritoneum with the tubercle bacillus may, for convenience of description, be considered as either direct or

indirect, although no strict line of demarcation can be drawn between the two.   It is direct when the bacilli are conducted into the peritoneal cavity and fix upon the lining wall of the abdominal parietes or upon the viscera.   It is indirect when the bacilli reach the peritoneum through the blood or the lymph.

The direct method is infrequent as contrasted with the indirect.   It can only happen in one of two ways, either through rupture of a focus such as a mesenteric or retroperitoneal infected gland, or by way of the Fallopian tubes.   In the latter case it is most commonly by extension from an already diseased tube, or the virus may be conducted from without through the patent tube into the peritoneal cavity.   For instance, such a case as that recorded by Vierordt (5) appears an example of the last method.   A child, aged six and a half years, had had a long-continued discharge from the vagina antecedent to the attack of tubercular peritonitis : in the discharge tubercle bacilli were found.   Direct infection from the Fallopian tubes is probably much commoner than is usually supposed, and as already indicated possibly explains the greater frequency of tubercular peritonitis in women than in men.   So far as operative experience goes there is now ample evidence forthcoming to prove the frequency with which the female reproductive organs are the seat of tubercular disease.   Mayo's (1) eleven cases of tubercular peritonitis in women, in nine of which the tubes were involved, have already been cited.   It does not necessarily follow, however, that when we find tubercular peritonitis in conjunction with tubercular salpingitis that therefore the former is dependent upon the latter.   In some instances it must be a matter of mere conjecture, and there are not wanting those who argue that the tubes are frequently infected from the peritoneum.   The question can probably be only answered when a marked disparity of age exists between the respective lesions, when, for instance, caseating masses exist in the Fallopian tubes in patients who have probably an antecedent history of pelvic trouble, and in whom the peritoneal affection is recent in symptoms and appearance.

While the rupture of some focus in a tubercular gland is occasionally a source of direct pure infection such lesions are more frequently followed by acuter forms of septic peritonitis. For more often than not a lymphatic gland contains other

micro-organisms than the tubercle bacillus, and these escaping at the same time into the peritoneal cavity give rise to a mixed infection, with results proportionately dependent upon the virulence of the freed micrococci or bacilli.

Indirect infection of the peritoneum must account for the largest number of cases; and transmission through the lymph channels is possibly more frequent than through the blood-vessels for this reason—that tubercular peritonitis is probably much commoner in cases of tubercular ulceration of some part of the intestinal canal than it is when the disease is situated at a distance without the abdominal cavity. It is true that in a vast proportion of the cases there is disease of the lungs; but then it is equally true that in these same cases there is also tubercular ulceration of the bowel, and it will almost certainly be from this source that the peritoneum is infected by way of the lymphatics. Independently, however, of any ulceration of the bowel, experiments made by Debroklousky (6) have shown that the tubercle bacillus can pass through the walls of the intestine without the necessity of any primary lesion, so that whether through the ingestion of infected milk or the swallowing of tubercular sputum, it is possible for the peritoneum to become diseased. It can be quite well conceived that if in place of a healthy bowel there is some catarrhal condition, such as so frequently exists in young children, there will be the greater likelihood of the transmission of bacilli through the weakened parietes when infecting material is temporarily lodged within the canal. The same remarks apply to the lymphatic glands, for these, too, by becoming weakened in some way, may not themselves be infected, but may thereby be the direct medium for the transmission of the bacilli to the peritoneal cavity. It will thus be seen that the possibility of primary infection of the peritoneum may, by no means, be such a rare event as considered by some.

There seems little doubt also that the lymphatics are responsible for the conveyance of the bacilli through the diaphragm in cases of tubercular pleurisy, for the association of tubercular peritonitis with this condition in the thorax is not at all uncommon.

The blood-vessels must be considered the sole means of infection where the original foci of disease are situated without the abdomen, as for instance, in cases of pulmonary disease,

tuberculosis of the bronchial glands and tubercular disease in the bones or joints.

An interesting question is why the peritoneum should so readily take on generalised infection. We must either assume that it is, in its normal condition, inherently susceptible to the lodgment and development of the tubercle bacillus, or that its resisting power must in some way be reduced before the bacilli can get a hold upon it. One is almost tempted to believe in the former view from the readiness with which the disease spreads in patients who, as will be shown later, present no physical signs of ill-health. On the other hand there is evidence to show that any weakening of the tissue by disease or traumatism renders it distinctly more susceptible. As instances of the latter effect I may refer to two or three cases introduced in a discussion which took place in the Chicago Surgical Society, on the subject of tubercular peritonitis. Plummer (7) related the case of a man who was kicked in the right iliac region. It being considered possible, from the nature of the symptoms, that the bowel was injured, the abdomen was opened. Nothing amiss, however, was discovered. About two months later he was again brought into hospital with symptoms of intestinal obstruction. The abdomen was reopened and very extensive tubercular peritonitis found. The author stated that a very thorough examination of the abdominal cavity was made at the first operation, and there existed not the slightest evidence of any tubercle infection, hence he considered it quite reasonable to assume that the injury was the direct predisposing cause of the tubercular peritonitis. Ochsner (8) in referring to a case of his own which resembled that of Plummer's, also directed attention to several that he had discovered in literature, and from these was derived the noticeable fact that as the result of traumatism the progress of the disease was very rapid as compared with its advance from other causes.

It would seem quite appropriate to include under this same heading of traumatism cases of apparently localised infection of the sac of a hernia. Not a few such cases have been recorded. Andrews (12) relates two cases and refers to others. It is possible that the chronic irritation of the peritoneal lining of the sac by the intermittent entrance and exit of the bowel, predisposes it to infection (see Case LI).

PATHOLOGY.

The two primary considerations in discussing the pathology of tubercular peritonitis are, first and foremost, the natural progress of the disease itself, and second, the particular phases it presents, as influenced by the tissue which it attacks. While tuberculosis is the same in whatever region it exists, it is largely modified by the conditions exercised through those regions. Hence, in the peritoneal cavity one may expect to find tubercles in every stage of development and decay, and certain results dependent exclusively upon the part played by the peritoneum.

It is customary to classify the lesions met with; and some three or four types of the disease are usually distinguished. Thus, one of the best classifications is probably that given by Murphy (51) :

(1) Disseminated, exudative, miliary, non-confluent, serous (ascitic) variety.

(2) Nodular, ulcerative or perforative (the least frequent variety).

(3) Adhesive, fibroplastic, cystic, partition or obliterative variety.

(4) Suppurative, circumscribed, or general mixed infection.

A somewhat shorter and simpler classification is that by Aldibert (9) and adopted by Treves (10) :

(1) The ascitic form;   (2) the fibrous form;   and   (3) ulcerous form.

For practical purposes such classifications are serviceable, but it would be wrong, from a purely pathological standpoint, to regard them as indicating any hard and fast line between the conditions thus tabulated. As a matter of fact in the majority of instances these so-called types of the disease are merely expressions of different stages of development, and a more proper appreciation of the whole subject is derived by describing the disease in this light.

Tubercular peritonitis in its initial stages is represented by the appearance on the surface of the serous membrane of numbers of greyish bodies discretely scattered over areas of variable extent (see Fig. 47). In some of its more limited aspects these tubercles are found on the peritoneum forming

the base of a tubercular intestinal ulcer; on the other hand, where the peritonitis is part of a generalised miliary tuberculosis the whole peritoneum, both parietal and visceral, is sprinkled with these minute granulations. The tubercles themselves are of the usual type and structure met with in other

Fig. 48.—Tubercular peritonitis. Coils of small intestine studded with miliary tubercles and fine flocculent shreds. (St. Mary's Hospital.)

parts of the body, and need not, therefore, be histologically described. Accompanying the deposition of tubercle there is a good deal of peri-tubercular exudation, which, as time goes on, may become more or less organised, so that the serous coat comes to assume a considerable degree of thickness

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and friability. The effect of this inflammatory process often leads to the pouring out of a good deal of clear serous fluid, and when this collects in any appreciable quantity we have what is usually regarded as the "serous" type of the disease. It is certain that very great variations exist in the quantity of fluid exuded, and between the merest moisture and quarts of serum there is every possible gradation. Many factors are probably at work in determining this particular feature. The acuter the disease and the greater the area of the peritoneum infected, the more reasonable it is to assume will be the quantity of fluid thrown out, while when the opposite conditions exist there may be practically no exudation. Mayo (1) gives it as his opinion that ascites is more common in women with tubercular tubes; while, in both male and female, fibro-plastic forms are relatively more common where the appendix or an unlocated intestinal lesion has been the source of peritoneal invasion.

As the disease progresses various other aspects of it are presented. Thus, where there is very little or no exudation, or where the exudation, possibly copious in amount, has been absorbed, the inflammatory surfaces of the peritoneum come into contact and adhere. The result is then what is usually regarded as the "adhesive" type of the disease, and extremely variable is the picture it may present. There may be seen in the same case adhesions without any tubercles, and adhesions freely besprinkled with them, also collections of fluid localised by the formation of adhesions around. It is this limited occlusion of serum with encircling masses of adherent intestine that sometimes gives rise to the formation of swellings within the abdomen often mistaken for tumours or cysts.

In the earliest stages of the formation of adhesions these latter are soft and flocculent, admitting of comparatively easy separation. They are well exhibited in Figs. 48, 49, and 50. The specimen from which Fig. 49 was taken is in the Museum of St. Thomas's Hospital (No. 1055). It shows the bowel to be covered—as was the whole of the peritoneum—with adhesions of loose connective tissue, and in some of these adhesions tubercles are seen to exist; the mesenteric glands are also enlarged and infected. Fig. 50 is from a specimen in the Museum of King's College (No. 948), and is a beautiful illustration of the flocculent character of the adhesions, which

are shown extending between the large and small intestine; and, as in the preceding specimen, the adhesions are studded with miliary tubercles.

As time proceeds the soft early adhesions partly disappear, and partly become organised into firmer bands and membranes. In many cases there is little doubt that the solitary bands are not the result of peritonitis as it is being described here, but

Fig. 49.—Tubercular peritonitis. The whole of the peritoneum is covered with adhesions of loose connective tissue, and in them are numerous tubercles. The mesenteric glands are also infected and enlarged. (St. Thomas's Hospital.)

due to the attachment of a tubercular intestinal ulcer or a caseous mesenteric gland to some other structure. In course of time the united parts become separated and the bond of union is represented by a band or membrane. As considered in the present connection the bands, cords, threads, membranes, or by whatever other name they may be called, are multiple, and are seen to be uniting coils of intestine together, or the

intestines to some part of the abdominal parietes.   The speci-
mens from which Figs. 51 and 52 were taken are good
examples of some of these organised forms of · attachment.
In Fig. 51, which is from a preparation in the Museum of
St. Thomas's Hospital (No. 1143), several of the coils of the
small intestine are united together by narrow thread-like bands,
and at one part quite a broad expansion of fibrous tissue knits
together the neighbouring coils.   In this specimen there also
existed numerous tubercles on the visceral parietes, some as
large as peas.   Fig. 52 is taken from a specimen in the
Museum of Charing Cross Hospital (No. 1020A) ; it is noted in
this case that the bands were particularly tough and evidently
of old standing, and, as so often happens under such circum-
stances, had been the means of causing acute intestinal obstruc-
tion.   Notwithstanding the apparent age of the adhesions the
peritoneum was wholly studded with miliary tubercles.   In
many other instances of old adhesions there is frequently found
cretaceous bodies in various parts of the peritoneum, and cal-
careous mesenteric glands, indicative of the nature of the
original lesion.

It sometimes happens that the intestines become so closely
matted together that nothing of the nature of fibrous-like
intervening adhesions are to be detected.   It is as if there had
been a universal glueing of the neighbouring bowel surfaces,
and that once so co-apted they had remained in direct contact.
This is well represented in Fig. 53, which is taken from a
specimen in St. Thomas's Hospital Museum (No. 1142).   The
matting is ascribed to "tubercular connective tissue, and of
comparatively old date," and "through the peritoneum are
discernible large masses of miliary tubercle."   Fig. 54 is taken
from a rather unique specimen in the Museum of the Royal
College of Surgeons, Edinburgh (No. 2220).   It is a section
through a mass of intestines matted together from tubercular
peritonitis, and shows from within the intestine what Fig. 53
represents from without.

The extreme toughness and density of many of these
adhesions is well known to all operators, who have not infre-
quently found, that in attempting the separation of united parts,
tearing of the normal tissues much more readily happens than
severance of the adventitious bands.

In pelvic tubercular peritonitis arising from tubercular

disease of the adnexa the matting is apt to be extremely
extensive and firm—so extensive sometimes that the various

FIG. 50.—Tubercular peritonitis. Adhesions between large and small
intestine studded with miliary tubercles. (King's College.)

parts cannot be differentiated, and so firm that separation is
impossible. The reason of this more advanced condition of the
adhesions in the pelvis is doubtless due to the comparative

fixation of the parts, and the want of that motile activity which exists among the intestines in the abdomen proper.

If we now trace onwards the progress of the miliary tubercle, we find the same changes ensuing as are observed in other parts of the body, modified to some extent, however, by the tissues in which they exist. Thus, increase in development leads to coalescence of tubercles, and so the parietes of either the abdomen or the viscera may show surface patches of variable dimensions. An appearance, such as that shown in Fig. 55, is a good illustration of what is not infrequently met with. The specimen from which the figure was taken is in the Museum of St. Mary's Hospital (No. 310), and is a portion of the peritoneum from the under-surface of the diaphragm; the tubercles have coalesced, and in places attained considerable size. In this way quite solid plaques may form. But coalescence and development may lead to the formation of comparatively large masses. Tubercles of the size of peas are common, and others as large as a marble are not infrequent. There is naturally, however, no reasonable limit to the size to which some of these tubercular masses may attain, and they are doubtless accountable sometimes for isolated hard tumour-like formations occasionally encountered in abdominal work.

Tubercles which have coalesced may undergo various retrogressive changes. The most favourable is that which involves their subsequent entire disappearance, and there seems no stage at which this favourable issue may not take place. Israel (11) records a rather striking instance of the comparatively rapid disappearance of tubercles the size of a cherry-stone. The case was that of a boy, aged sixteen years, in whom the symptoms progressed somewhat rapidly, with high fever and severe abdominal pain. On opening the abdomen the mesentery and the peritoneum were found to be covered with tubercles the size of a cherry-stone. The temperature returned to normal, but in other respects he did not improve, and the abdomen again increased in size. It was reopened thirty-six days after the first operation, when it was found that the tubercles had all disappeared. From this time onwards the patient made uninterrupted progress to recovery.

If, however, absorption does not take place completely, healing may to some extent result from the calcification of the caseous tubercles. It is not uncommon to find rounded

FIG. 51.—Tubercular peritonitis. Coils of small intestine united by bands and threads of connective tissue. Below is seen a broad membranous attachment. Tubercles as large as peas existed on the parietes and on the adhesions. (St. Thomas's Hospital.)

cretaceous bodies scattered about in various parts of the perito-neal cavity.

When absorption does not take place at a comparatively early stage caseation may end in the formation of a tubercular abscess. This in itself may not be of serious moment, for absorption may still take place or the abscess may burst into the bowel, or find its way externally through some part of the abdominal parietes. For a somewhat inexplicable reason the umbilicus is a very frequent seat for the discharge of intra-abdominal tubercular abscesses. Some of them are undoubtedly connected with the bowel, and have already been fully dis-cussed (see page 99) ; but there seems no question that tubercular peritonitis is itself responsible for many of these fistulæ. The chief danger connected with a tubercular abscess is the possibility of mixed infection—that is, the conversion of a purely practically harmless tubercular process into a dangerous septic one. These cases are by no means infrequent, and are marked off by very definite clinical symptoms. Case XLI is a very good illustration of the multiple formation of such abscesses among the coils of the intestine.

SYMPTOMS.

There is little doubt that much confusion has existed in the past regarding what symptoms should be exclusively considered as due to tubercular peritonitis. Many of those given in text-books are attributable, not to involvement of the peritoneum, but to disease of parts which have themselves been the starting-points of the tubercular peritonitis. If we consider a case in which the peritoneum is the sole structure in the body infected—in other words, a case of primary tuberculosis—it is certain that in many cases the earlier stages of the disease would present, if not the entire absence of any signs, certainly only the vaguest indications, which in themselves would be insufficient to be of any diagnostic value. Let me instance this by a brief refer-ence to some recorded cases. Wallace (13) narrates the case of a child in the East London Hospital for children, who was admitted for the purpose of having its inguinal hernia cured. It was noticed that the sac seemed very thick. When opened it was found to be studded inside with miliary tubercles. On examining the abdomen with the finger it appeared that the peritoneum was in

a similar condition. The sac was excised and the wound healed up in the ordinary way. At a period of six months after the child was "well, fat and bonny." Somewhat similar to this case is one recorded by Kennedy (14). A healthy-looking male child, aged fourteen months, born of healthy parents, was admitted to hospital for the treatment of a double inguinal hernia. When the sac was opened a coil of intestine presented and was

Fig. 52.—Tubercular peritonitis. Old adhesions which had caused acute intestinal obstruction. (Charing Cross Hospital.)

found to be covered with tubercles. A few tubercles were snipped off and identified by finding the tubercle bacillus. Owen (15) also relates a case. It was that of a boy who had a little abdominal discomfort, but nothing more than what was considered attributable to the hernia for which he sought treatment. When the sac was opened a quantity of clear serous matter escaped, and the omentum came down peppered all over with miliary tubercles. He made an uninterrupted recovery, with no further manifestation of his tubercular diathesis.

It is interesting to note, and is a feature of some diagnostic significance, that in all these cases immediately the sac was opened a quantity of clear serous fluid escaped.

Such an insidious onset as these cases exhibit may indicate a much larger number of cases of primary tubercular peritonitis than we have any conception of, for, as these discoveries of a tubercular peritonitis were quite accidental, it is more than likely that there are numerous cases, in children particularly, where nothing except a little temporary abdominal discomfort has existed, indicative of a disease which has run an undetected course and disappeared without causing any serious mischief. These latent cases are, however, of little or no clinical value, except in so far as they demonstrate the fallacy of too readily accrediting any particular line of treatment with the merit of being a specific remedy.

The following case may be instanced as one which gave strikingly little indication of the presence of tubercle abundantly distributed over the surfaces of the visceral and parietal peritoneum.

CASE XXXVIII. *Tubercular peritonitis; serous effusion; symptoms slight; laparotomy; removal of fluid; cure.*

R. B—, aged eight years, was admitted to the Victoria Infirmary in September, 1907. His symptoms commenced three months ago with a sharp attack of abdominal pain, which " doubled him up." A month later he had a second similar attack, and at this time his mother noticed that his belly was swollen. His bowels had remained regular, there never having been any diarrhœa. He had gradually got thinner.

On admission it was noticed that he was poorly nourished, tongue furred, temperature 97·6° F. The abdomen was swollen, tympanitic to percussion, and not tender to palpation. During the few weeks he was under observation it was often noticed that his motions contained some mucus, but otherwise they appeared normal. His appetite was always good, and he was slowly putting on weight. He was cheerful, slept well, and ran about the ward during the day like a boy with nothing wrong with him. However, his temperature usually ranged between 97° F. and 99° F., sometimes rising to 100° F. His pulse varied between 80 and 100. His abdomen manifested signs of fluid, which was gradually increasing in quantity. Tuberculin was injected for diagnostic purposes. The first dose given was ·025 mg., the second, ·25 mg., and the third, 5 mg. It was only after the last that a slight reaction was observed ; the pulse ran up to 140, and the temperature to 100·5° F.

The abdomen was opened by a small incision, and about two pints of clear straw-coloured fluid was let out.   A piece of small intestine presented at the wound, and was seen to be sprinkled on its surface with miliary tubercles.   On introducing the index finger the whole parietal peritoneum was felt to be studded with similar tubercles.   At the upper part of the abdominal cavity a nodular mass was felt which suggested either a thickened and contracted omentum or a mass of lymphatic glands about the head of the pancreas.   The wound was closed without drainage.

Fig. 53.—Tubercular peritonitis.   Several coils of small intestine closely united together by old adhesions.   A large number of miliary tubercles exist on the peritoneal surface.   (St. Thomas's Hospital.)

The child made a rapid recovery, and in a fortnight was sent to the convalescent home.   A week later a note was received to the effect that he was perfectly well.

The case is certainly a remarkable example of how much tubercle may be present in the peritoneal cavity with practically no manifestations so far as the patient's general health is concerned.   The slight amount of mucus occasionally observed in

the stools suggested that there may have existed some little
primary ulceration of the bowel, and that the two sharp
attacks of pain felt before the abdominal swelling was noticed
indicated the period at which initial infection of the peritoneum
took place.   As regards the removal of the fluid by operation,
it is quite possible that this measure accelerated recovery,
although it is equally reasonable to assume that the case was
just one of those which sooner or later would have yielded to
the effects of purely medical treatment.

When such symptoms as general emaciation, poorness of
appetite, diarrhœa, furred tongue, evening rise of temperature,
etc., have been known to exist prior to the manifestation of
any positive abdominal symptoms, it is more than likely that
ulceration of the bowel has been the cause of the tubercular
peritonitis.   Similarly symptoms suggestive of derangements of
the female reproductive organs may be regarded as indicative
of disease of these viscera rather than as signs of tubercular
peritonitis, which is in reality only a secondary development.
Again, pain of a colicky character associated with attacks of
vomiting is much more likely to be the result of obstruction in
the bowel due to a constricting tubercular ulcer, or to external
adhesions, than to mere involvement of the peritoneum with
tubercle.

Apart, however, from what may be more strictly regarded as
constitutional symptoms, there are certain local manifestations,
observed more particularly as the disease advances.   Most
prominent among these is distension of the abdomen (see Fig.
56).   This is most frequently met with in young patients, and
indicates either effusion of fluid or distension of the intestine,
or, as is more often the case, these two conditions combined.
The quantity of fluid is extremely variable, and may pass freely
from one part of the abdomen to another, or be enclosed by
adhesions forming encysted collections.   The fluid may be clear
and straw-coloured, or tinged with blood, but rarely is it turbid
from the presence of pus cells.   One effect of the distension
is pressure upon the vena cava, so that enlarged veins are
sometimes seen extending both from below and above over the
swollen abdomen.   It is also probably owing to this venous ob-
struction that the abdomen has occasionally a somewhat livid
appearance and doughy consistency.   These particular symptoms
are usually more evident in children, but in them, again, they

are by no means frequent.   Rotch (4), in his sixty-nine cases
of tubercular peritonitis in children under twelve years of age,
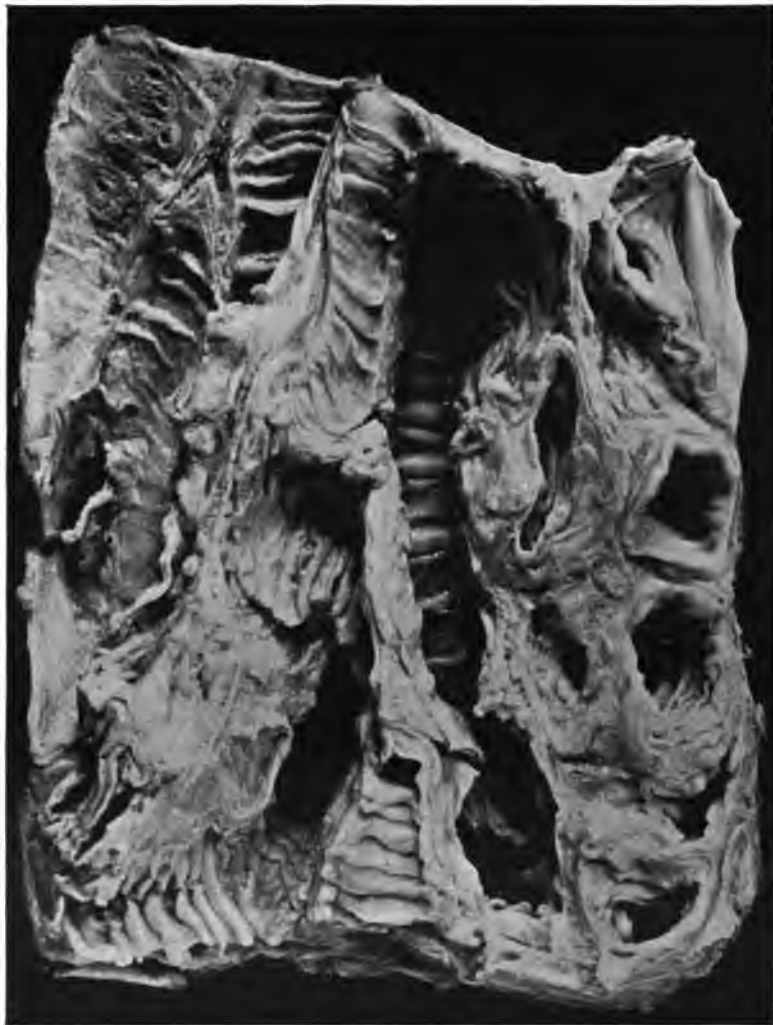
FIG. 54.—Tubercular peritonitis. Section through a mass of matted
intestine.   Tubercles are discernible in places, and some small tuber-
cular ulcers exist in the bowel. (Royal College of Surgeons, Edinburgh.)

only observed distension of the abdominal veins in three.
When distension is marked there is usually considerable emacia-

tion, and the swollen belly stands out in marked contrast to the visibly projecting ribs and the thin and shrunken arms and legs.   This is well seen in the illustration (Fig. 56), which was taken shortly after the death of the child, the photograph taken during life having proved a failure.   That distension of the intestine may take place independently of obstruction is rendered probable from the paralysing effect of the inflammation associated with the deposition of tubercles.   In those cases where the infection is rapid and acute the inflammation probably extends through the serous coat of the bowel to its muscular tunic, and as is well known, an inflamed muscle becomes a paralysed muscle.   The following case I think worth recording in this connection, for it seemed impossible to explain the intermittent segments of distended small intestine except on the assumption of inflammatory paresis of the bowel wall.

CASE XXXIX. *Tubercular peritonitis; intestinal obstruction from inflammatory paresis; laparotomy; no adhesions; cure.*

Isabella R—, aged five years, was admitted to the Victoria Infirmary in June, 1905.   The history given was that up to six days previously she had seemed "absolutely well," but at this time she awoke in the night complaining of a "sore belly," and vomited.   Since this attack there had been only very slight movement of the bowels.   These symptoms continued until admission on the seventh day after the initial seizure.   Her family history showed a very strong tubercular taint, especially on the father's side, he being himself ill with phthisis.

On admission the child looked very toxic, with bright eyes and flushed cheeks.   The tongue was covered with a brownish fur.   The abdomen was somewhat rigid and tender, and did not move with respiration; elevations and depressions were seen upon it which suggested the outlines of distended coils of intestine,   It was tympanitic to percussion.   The temperature was 97° F., and the pulse 140.   An enema was given, but with no result.

Operation.—On opening the abdomen several coils of distended and injected bowel presented.   Nodules of variable size were seen studding both the parietal and visceral peritoneum.   No adhesions existed ; and in searching for any possible cause for obstruction several coils were found distended, and several collapsed, with between these apparent but not real constrictions.   Manipulation of the coils seemed to relieve the obstruction, but before returning the partially exventrated gut it was tapped, and a quantity of thin yellowish fæcal material removed.

The child made a somewhat tardy recovery, but left the Institution two months after the operation in, as the report states, "a generally satisfactory condition."   I saw this child eighteen months after she had left the Hospital.   She was in excellent health, taking her food well, and with normal action of the bowels.   An examination of the abdomen showed it to be perfectly natural.

When tubercular peritonitis has reached the stage of well-formed adhesions the symptoms that subsequently develop are
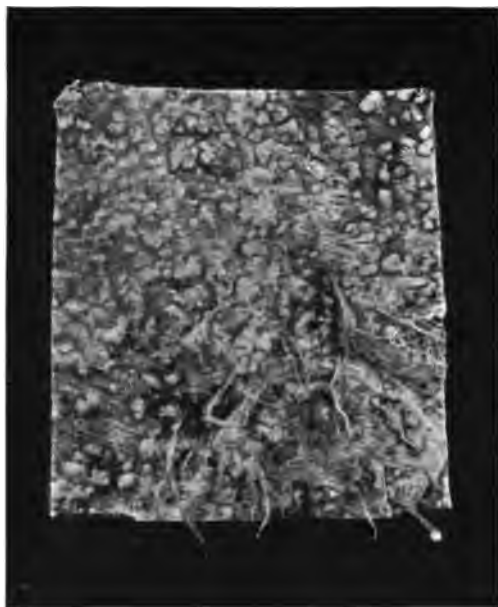
Fig. 55.—Tubercular peritonitis. Miliary tubercles on the peritoneum covering the diaphragm, which have coalesced and attained considerable size in places. (St. Mary's Hospital.)

usually of an entirely obstructive character. As a rule the patient suffers from intermittent attacks of colic of variable degrees of acuteness, not infrequently associated with nausea, or even vomiting. As may be judged from a consideration of the variety of the fibrous bands and membranes described under the heading of "Pathology," the effects of these upon the normal functions of the bowel must be extremely diverse, so that no two cases are ever likely to present similar symptoms, although it would be quite right to say that each patient is

suffering from tubercular peritonitis. It is needless to enter into the large subject of intestinal obstruction by bands, kinking, adhesions, etc., I will simply give one case in illustration of where the symptoms were acute in onset and due to fine constricting bands. Other cases illustrative of chronic obstruction from adhesions will be found under the headings of " Prognosis " and " Treatment," where they are introduced for the special purposes of those sections (See Cases XLV and XLIX).

CASE XL. *Tubercular peritonitis; acute intestinal obstruction; laparo-tomy; fine constricting bands and adhesions; death.*

A female child, aged three and a quarter years, was admitted into the Victoria Infirmary. Previous to three days before admission the child is stated to have been free from any ailments, except that it was occasionally loose in the bowels. Somewhat suddenly at this time she commenced to vomit, accompanied with some comparatively slight abdominal pain. On admission on the third day of the illness it was stated that the bowels had not moved since the symptoms had started. The abdomen was uniformly and considerably swollen, tender to pressure, and somewhat rigid. The vomited material had a fæcal odour. Within an hour and a half of admission the abdomen was opened ; greatly distended and congested coils of intestine presented. In attempting to discover the cause of obstruction collapsed bowel was found in the right iliac fossa, and in further attempting to examine the part much matting was found to exist about the cæcal region. The adhesions in some places formed bands, one of which was found to pass from this region to a distended coil. In addition to the firmer adhesions there appeared to exist a good deal of recent inflammatory mischief. Numerous minute tubercles were seen studded over the peritoneal surfaces of the bowel and the parietes in the affected region. The distended intestine was tapped, and a quantity of fœtid fluid fæces and gas escaped. The bowel wall appeared to have lost all power of contraction. The parietal wound was closed without drainage. The child looked very bad at the conclusion of the operation, which lasted three quarters of an hour. It rallied well, but soon showed signs of collapse, and died four and a half hours later.

Permission was only granted for an examination of the abdomen after death. In attempting to remove the coils of small intestine numerous old adhesions were met with. In some instances these consisted of tough fibrous cords passing between separate coils, or uniting the bowel to some part of the mesentery or parietal peritoneum. In the mesentery were numerous enlarged glands. In lifting the distended

.coils of small intestine out of the abdomen, the collapsed portion was reached ; the adhesions and bands which had to be broken through to do this left it doubtful which had been the constricting or obstructing agent.   It seemed probable, however, that the long loop of small bowel had been strangulated by a band which had been detached at the operation.   In the right iliac region the matting of the collapsed ileum was very considerable, coils of intestine being very tortuous and bound down inseparably to the cæcum.   In all this region both parietal and visceral peritoneum were abundantly sprinkled with tubercles.   On opening the bowel numerous tubercular ulcers were found.

Fig. 56.—Tubercular peritonitis.   Shows marked distension of the abdomen, with great emaciation.   (Photo by Dr. John Anderson.)

Apart from the effects of bands and adhesions upon the intestine, there are certain symptoms arising out of the attachments of the pelvic viscera to one another and to the parietes by these same organised exudates.   Thus, the bladder may be hampered in its function and lead to both painful and frequent micturition.   Kelly (16), speaking of pain in urination in women, regards it as the most characteristic of all symptoms. Out of twenty cases of tubercular peritonitis only three were free from it ; it is referred to the back, lower abdomen, and pelvic organs.

One of the most confusing and complicating processes which may be associated with tubercular peritonitis is mixed infec-

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tion. It leads to a train of symptoms of a much severer type. Patients so infected may resemble, and have been mistaken for, cases of other septic conditions. The temperature is usually high; there may even be rigors. The tongue is often dry and covered with brown fur. Anorexia is usually complete and the bowels may be loose; the symptoms, indeed, are much more those of a septic toxic character than of a pure tuberculosis. When the abdomen is opened localised collections of pus are found sealed off by adhesions. In some cases these abscesses burst into the bowel or the bladder, or make their way out through the abdominal parietes, or end in causing a fatal purulent peritonitis. The following case may be taken as a fair illustration of a patient in whom at one time there had been a tubercular peritonitis, but where, for some inexplicable reason, septic infection had ensued.

CASE XLI. *Tubercular peritonitis; subumbilical fæcal fistula; localised collections of pus; subsequent purulent peritonitis; death.*

Annie L—, aged thirteen years, was admitted to the Victoria Infirmary in November, 1906. The history given was that up to ten days before admission she had been in good health, but at this time she began to complain of pain across the abdomen and to be troubled with vomiting and diarrhœa. These symptoms continued until the day before entering the Infirmary, when some tenderness appeared around the umbilicus, and shortly afterwards a discharge took place from it. On admission she was noticed to be rather flushed, but apparently free from pain. Her temperature was 101° F. and her pulse 116. The abdomen was not swollen and there was no marked rigidity, but distinct tenderness existed round about the umbilicus and extended downwards towards the right iliac region, and slightly also to the left side. Very foul-smelling pus with a fæcal odour exuded from the umbilicus. On introducing a probe it was found to pass down to the right side and caused the escape of more discharge and some gas. The patient had a slight cough, but no spit; dry and moist râles were heard over both apices, but there was no dulness to percussion. During the nine days she was under observation she suffered from diarrhœa and increasing discharge from the umbilicus. Her cough gave her a good deal of trouble, and suggested at one time more pulmonary than abdominal mischief. Her temperature varied between 101° and 103° F., standing usually at 102° F. She died on the ninth day with no other marked symptoms.

A *post-mortem* was made by Dr. John Anderson. A general purulent peritonitis was found with extensive matting of the intestines by

old adhesions.   Perforations were noted in two or three places in the lower part of the ileum, and the whole length of this part of the bowel was sprinkled with small tubercular ulcers.   The entire small intestine was remarkably thin-walled and congested throughout.   On separating the adherent loops of gut small pockets of greenish pus were observed free from fæcal matter.   The fistulous opening was situated just below the umbilicus and led into a cavity formed and bounded by matted loops of intestine; there was no communication with the bowel.   No other intra-abdominal lesions were found except some enlarged mesen-. teric glands, one of which, situated close to the ileo-cæcal valve, was soft, broken down, and had burst.   The lungs at both apices were adherent, and at both bases passively congested and œdematous.

DIAGNOSIS.

In attempting to diagnose tubercular peritonitis it is almost of equal importance to ascertain the cause upon which it depends, and this can often be correctly done by a careful investigation into the earliest symptoms.   Indeed it may be said that much help is obtained in confirming an otherwise doubtful diagnosis of tubercular peritonitis, by the knowledge of pre-existing tubercular disease elsewhere.   The previous history of the case, therefore, resolves itself into questions which concern principally the lungs, the intestines, and the female reproductive organs.   Cough, obstinate diarrhœa, and menstrual derangements are important symptoms to inquire into.   The family history and the immediate surroundings of the patient are also factors to be carefully considered as possible predisposing causes.

It has been clearly shown under the heading " Symptoms," that diagnosis of tubercular peritonitis in its earliest stages may be quite impossible, for the simple reason that there are practically no symptoms manifested, and if there should be any they are of so slight and transitory a character as to be frequently attributed to some passing functional disturbance of the stomach or bowels, and so their true significance overlooked. It is only when the abdomen presents very obvious manifestations that the question of tubercular peritonitis is raised, and then, from the want of any purely pathognomonic signs, it is usually a matter of differential diagnosis between tuberculosis and other conditions which simulate it.   The difficulties in this particular respect will be referred to later.

The disease in its most typical form is presented in children with swollen bellies and emaciated trunks and limbs.   In some cases the skin presents a greyish, almost livid appearance, doughy in consistency and with enlarged veins radiating, both from below and above, over the distended belly.   The presence of free fluid in the peritoneal cavity, when in sufficient quantity, will be detected by the interchange of areas of dulness and tympanicity to percussion on any change of position.   It should be noted that examination *per rectum* can sometimes detect a fluid impulse when percussion-pressure is exercised through the anterior abdomen.   Among the early signs in children of tubercular peritonitis Branson (17) attaches considerable importance to the detection of enlarged glands ; an anæsthetic is administered and the examination made bimanually as well as abdominally.

The condition of the bowels is very variable, and when marked derangements exist, as represented by obstinate diarrhœa, constipation or even obstipation, it is more than likely that the intestines are themselves at fault rather than simply the peritoneum.   The same causes probably explain loss of appetite, nausea and vomiting, furred tongue and offensive breath—symptoms met with in some cases.

Pain, also, is extremely variable.   In some of even the most advanced cases it may be entirely absent, while when markedly present it more often than not indicates a certain amount of intestinal obstruction, the result of strictures or adhesions. When the history reveals intermittent attacks of abdominal pain, prior to the appearance of more marked abdominal manifestations, it may pretty safely be taken to indicate primary bowel tuberculosis, or the pre-existence of adhesions, the result of some antecedent attack of tubercular peritonitis.   Palpation sometimes causes pain ; this, again, is very variable, and doubtlessly accounted for by the acuteness of the process and the extent to which the parietal peritoneum is involved.   In certain more advanced conditions it may be possible to detect masses of induration, either actually within the abdominal cavity or in the parietes, these being the result of coalescence and development of tubercles.   One of the most marked masses sometimes detected is the thickened omentum, a condition that will be more fully referred to later.

The temperature, like the rest of the symptoms, presents no

characteristic features, for it may be normal or raised. A persistent rise of temperature in the evening is significant of advanced disease, as, also, is the existence of profuse night sweats. When a temperature is maintained both morning and evening it is strongly suggestive of mixed infection. The latter state is well represented in those cases where, at operation, small localised abscess collections are found in amongst the adherent coils of intestine, or in the pelvis, connected with a tubercular salpingitis.

The known existence of a pleurisy, prior to the symptoms of peritonitis, is in itself strongly suggestive of the tubercular nature of the latter.

As a means of diagnosis tuberculin has in some cases been employed, but in the case of infants and children, as pointed out by Rotch (4), a reaction, when it occurs, is of value, but its negative evidence must not be accepted as decisive. (See pages 74 and 134 for a full description of the methods of using tuberculin for diagnostic purposes.)

With regard to the condition of the blood, Rotch (4) states that the presence or absence of leucocytosis was of very little value in either the diagnosis or the prognosis of tubercular peritonitis in children as determined by making blood counts in twenty-three out of his sixty-nine cases.

The conditions with which a supposed generalised tubercular peritonitis are liable to be confused are ascites from hepatic or cardiac trouble, gastro-intestinal diseases in children, and malignant disease. With regard to the first, the difficulty is rather increased from the fact that tubercular peritonitis and hepatic cirrhosis may co-exist. It will not, therefore, be so much by the local manifestations that a differentiation will be made as by a general survey of the whole case in its history, and in other constitutional symptoms. In the case of gastro-intestinal diseases, Branson (17) draws particular attention to the simulating appearances of chronic gastro-enteritis in children. There is tympanitic distension of the belly, with unhealthy motions and loss of weight and health. He gives as a distinguishing feature that under an anæsthetic nothing abnormal can be made out by palpation.

With regard to malignant disease, the greatest possible difficulty may sometimes be encountered. The peritoneum may undergo an invasion almost identical in appearance to that

resulting from tuberculosis, effusions of fluid may take place and a general abdominal distension ensue, resembling in all respects that seen in a typical case of tubercular peritonitis. And these similarities do not seem limited to any particular type of malignant disease. Parkinson (18) refers to the case of a girl, aged twelve years, who died from colloid carcinoma of the peritoneum, in which the symptoms were those of tubercular peritonitis. Branson (17) mentions once having seen a case of diffuse peritoneal sarcoma in a child mistaken for the same disease. And a case has come under my own observation in which I mistook the symptoms for tuberculosis. The case lay in the wards of my colleague Dr. Ebenezer Duncan, to whom I am indebted for fuller notes concerning it.

CASE XLII. *Carcinoma of the peritoneum; primary carcinoma of stomach; symptoms those of tubercular peritonitis.*

D. K—, aged nineteen years, was admitted to the Victoria Infirmary in October, 1906. According to his own statement he had been well up to the onset of his illness some fourteen days previous, except that for a couple of years he had off and on suffered from a cough and spit. At the time when he was taken ill he was viewing a football match. He suddenly felt chilled, and complained of pain in the abdomen. From this time his abdomen gradually began to swell, and he noticed he was becoming much thinner. His bowels had been constipated, more particularly within the last few days, but flatus had passed. He had never vomited nor apparently suffered from indigestion. His mother died at the age of forty-seven of tubercular ulceration of the bowel.

On admission to the Infirmary fourteen days after the stated commencement of his illness he was noted to be pale and emaciated; his tongue was dry but clean; his temperature 98·4° F., and his pulse 90. His chief complaint was a sense of great discomfort in his bowels. The pulmonary sounds were normal. The abdomen was tense and greatly distended, and showed well-marked veins coursing over it. It was not tender to percussion; dulness existed in the flanks but tympanicity in front and upwards over the hepatic region masked any delineation of the liver.

The bowels were well moved with an enema. Eighteen ounces of clear straw-coloured fluid were removed by trocar and cannula. Large, hard, irregular masses were then felt all over the abdomen, but more particularly in the epigastric and umbilical regions. The fluid re-accumulated, and was withdrawn some two or three times, and always

clear and straw-coloured.   Pain was not complained of, but vomiting became troublesome, especially towards the end.   He died quietly fourteen days after admission, that is to say, only about a month after the commencement of his illness, according to his own statement.

A *post-mortem* was conducted by Dr. John Anderson.   On opening the abdomen the omentum was found puckered up and infiltrated with tumour nodules of small size, resembling in appearance miliary tubercles.   The parietal and visceral peritoneum were studded with small nodules, and the loops of the intestine were united together by a fibrous exudate.   The mesenteric glands were enlarged.   On separating and removing the intestines a tumour mass was found in the position of the lesser curvature of the stomach, involving the wall of the organ and the adjacent glands.   On opening the stomach it showed a malignant tumour of the lesser curvature, beginning at the cardiac end close to the œsophagus and extending for a distance of nearly three inches in the direction of the curvature, passing downwards, also, a short distance on both anterior and posterior walls.   The great curvature and the greater part of the anterior and posterior walls and the pylorus were uninvolved.   The liver was of normal size, but extensively studded with malignant tumours which varied in size from a pea to a hazelnut.   The intestines were normal.   The type of the tumour was shown to be a glandular-celled carcinoma.

The tumour in this case evidently commenced in the stomach, and in such a part of the organ that the early symptoms were of the slightest possible description.   The acute exacerbation was doubtlessly due to the invading effects of the growth upon the peritoneum, and in this respect the symptoms presented a striking resemblance to those met with under precisely similar invasions of the peritoneum by tubercles from advanced foci of the disease in other parts.

It is possible that where difficulty is experienced in arriving at a diagnosis tuberculin might assist in differentiation, provided always that old tubercular foci do not exist in some part of the body, for the presence of such would complicate and confuse the issue.

The question of the temperature may in itself prove misleading, and instances are recorded where its similarity in tubercular peritonitis to that of typhoid fever has led to a mistaken diagnosis of the latter.   Eisendrath (19) refers to a case where the patient had all the symptoms of enteric, for which she had been treated for six weeks.   The temperature ranged

from 103° to 104° F.   Osler (20) also refers to this occasional mistake.

Some of the greatest difficulties connected with differential diagnosis are found in those cases of localised tubercular peritonitis, or of generalised tubercular peritonitis which has led to the subsequent formation of localised swellings.   It is no uncommon event to be confronted with a case that simulates a cyst or tumour of some kind, and quite a number of cases are recorded where errors of diagnosis have been made under these circumstances.   A few may be referred to.   One of the earliest illustrations, and one which might now be deemed almost classical, is that of the late Sir Spencer Wells, who in 1862 operated upon what proved to be a collection of fluid between adherent coils of intestine under the impression that he was dealing with an ovarian cyst.   A similar mistake was made in a case reported by Parkes (21), who diagnosed the condition as an ovarian tumour.   In some other cases the localised collections of fluid together with the matted intestines have given rise to a diagnosis of a tumour of the omentum, or some kidney condition.   Thus Briddon (22) records an instance where the case was taken for one of either a tumour of the omentum, or an enlarged floating kidney.   Holmes (23) relates the case of a boy diagnosed as a right hydronephrosis.   Eisendrath (19) describes a case where a similar diagnosis was made of hydronephrosis, alternative to a mesenteric cyst.   In other instances it is simply stated that a tumour existed without defining its supposed nature.   Owen (15) describes the case of a girl who had an immovable tumour about the size of a duck's egg in the right lumbo-inguinal region ; it was surrounded by resonant intestine.   There were no symptoms and nothing to indicate the nature of its connections.   " When cut down upon it was found to be a large collection of tuberculous serum locked into and tightly distending a space among adherent coils of intestine."   Shutt (24) mentions a case where a child had a tumour on the right side.   The regularity and size of the tumour left it in doubt as to its nature until laparotomy was performed, when it was found to be " matted intestines, omentum and large tubercles."   Treves (10), in discussing the curious mimicry met with in localised tubercular peritonitis, instances other conditions as cyst of the liver, tuberculous kidney, perityphlitic abscess, internal hernia, fibroma

and sarcoma of the abdominal wall. But it is needless to single out further examples. It will be sufficiently gleaned from the above that there is hardly any intra-abdominal swelling which may not be simulated by conditions such as a localised tubercular peritonitis is capable of giving rise to. The practical teaching, however, is that when face to face with an obscure swelling in the abdomen, and more particularly in children, we should be alive to the possibility of a tubercular lesion of the nature of that under discussion. I have personally once encountered such a case as those referred to above. It was sent into my female ward as possibly a tumour in the pelvis or hypogastric region. Physically, it presented the characters of such from the well-marked projection of the lower part of the abdomen. There were, however, other features about it which led me to suspect that it might be of tubercular origin, and if so connected with the Fallopian tubes. But I will let the case speak for itself.

CASE XLIII. *Localised tubercular peritonitis; simulation of an abdominal tumour in hypogastrium ; laparotomy ; serous fluid in pelvic cavity with extensive tuberculosis of adnexa; removal of latter ; no improvement.*

B. V—, aged twenty-two years, was admitted into the Victoria Infirmary in September, 1907. She stated that her illness commenced about two months ago with pain of an intermittent nature in the abdomen. Up to this period she appears to have been in good health. She had never had a cough. Her bowels had been regular and her periods normal. Since the commencement of her illness she had had occasional attacks of diarrhœa. She soon noticed that her abdomen was becoming swollen, more particularly below. There had been no frequency of micturition. The marked swelling of the abdomen had led some of her doctors to think that possibly a tumour of the nature of a cyst existed in the pelvis. She was therefore sent into a surgical ward under the impression that a tumour existed for removal. No tubercular history was forthcoming either in regard to herself or her family.

On examination the patient was seen to be emaciated and pale-looking. There was a uniform swelling in the hypogastric region extending to each side. This was somewhat tender on pressure, dull to percussion, and gave a sense of elasticity. Examination *per vaginam* conveyed no signs of a tumour in or near the pelvic cavity, nor of the presence of fluid. The uterus was fixed and the adnexa could not be

felt.   Her temperature remained persistently high, rising at night to 101° and dropping in the morning to 99° F.   The lungs appeared healthy ; tongue clean ; urine normal.

The abdomen was opened by a curvi-linear incision, five inches in length, about one and a half inches above the pubes.   A cavity was then entered, from which a quantity of clear serous fluid escaped.   This cavity appeared to be lined with extremely thick membrane densely sprinkled with tubercles on its inner surface.   It seemed to be the peritoneum of the pelvis ; but an adventitious lining membrane had formed, which had shut off the intestines above.   The uterus and adnexa were buried in its thickened walls.   In detaching the former, which was executed with considerable difficulty, half an ounce or so of purulent fluid was liberated on each side in the immediate neighbour- hood of the tubes.   It was impossible to differentiate the tubes from the ovaries as they seemed to be converted on each side into a tuber- culous mass. After removal both tubes were seen to be dilated, tortuous, and filled with a quantity of broken-down thin caseous material. Before closing the abdominal wound about a tea-spoonful of pure iodo- form was inserted to the bottom of the cavity, and a plug of iodoform gauze and a drainage-tube led out from the centre of the wound.   The plug was removed in two days, but an ounce of 10 per cent. solution of iodoform in glycerine was for several days injected into the wound.

For some days there seemed some slight improvement ; but then the abdominal wound commenced to discharge freely, the temperature to rise, and the patient to emaciate.   The general appearances were those of mixed tubercular infection, and of a condition which would gradually and slowly lead to death from inanition.   She left the Infirmary in about four weeks after the operation.

Dr. John Anderson reported that the tubes and ovaries were shown by the microscope to be tubercular.

There is little doubt that in this case the peritonitis arose from the tubercular disease in the Fallopian tubes, and that the persistently high temperature was due to the mixed infection which had taken place in the region of each tube, as shown by the pus liberated on their removal.

As another illustration of a localised peritoneal tuberculosis simulating a tumour Case XLIX should be read.

One or two other practical points may be referred to before leaving the subject of diagnosis.   These refer to information gleaned on opening the abdomen.   When clear serous fluid escapes immediately on entering the peritoneal cavity, in cases where no question of acute intestinal obstruction arises, it may

be taken as significant of tubercular peritonitis.   In the presence of malignant disease the fluid is usually blood-stained, or presents the still more typical appearance of prune juice. It is interesting to note that the case already narrated (see Case XLII) of extensive malignant disease of the peritoneum proved a singularly striking exception to the rule, for in that case, as stated, several ounces of clear straw-coloured fluid were on three separate occasions removed by tapping.

The character of the tubercles seen on the surface of the peritoneum, whether parietal or visceral, can rarely be mistaken, although there are not wanting illustrations of granular-like projections, which have received the name of pseudo-tubercles, that do not appear to owe their origin to the tubercle bacillus. In some instances, also, carcinomatous nodules approach very much in appearance those of the typical tubercle, and particularly is this the case when the type of that due to the bacillus is large, the result of development and coalescence.

A fact of some practical value is, that when tubercular peritonitis owes its origin to a definite focus of infection the tubercles are more abundant about that particular region, so that we may sometimes take the increasing distribution of tubercles as a guide to the original seat of disease.

It is always a simple matter to excise a tubercle when we are in any doubt regarding the true nature of the disease, so that its tubercular nature or not may be settled by the aid of the microscope.

When dealing with adhesions, the cause of obstruction, the presence of miliary tubercles will at once decide the question of their origin, but failing the existence of these, the presence of enlarged and hard mesenteric glands may be taken as sufficient confirmation of their tubercular nature.

PROGNOSIS.

No class of cases presents greater difficulty in the matter of prognosis than that of tubercular peritonitis, and for two very good reasons : First, much depends upon the patient's individual power to combat the onslaught of the tubercle invasion —and that is a factor regarding the cogency of which we have often very little means of judging. Second, we are frequently in difficulty in knowing the primary cause of the disease.   If we

were able to regard in any given case the disease as primary
in the peritoneum, and solely limited to that membrane, then
possibly no form of tuberculosis in the human system would
admit of a more favourable prognosis. This is amply testified to
by those cases already narrated, where by an accident tubercular
peritonitis was discovered in children who had shown no sym-
ptoms before and who never presented any after (see page 280).
But such a form of tubercular peritonitis must be regarded as
an exception to the rule, which is, that the large proportion of
all cases owe their origin to a definite lesion in some other organ
or tissue. Hence the prognosis to be of any real value must
be based upon a right appreciation of the initial focus of the
disease, and not merely upon the secondary involvement of the
peritoneum. It will, therefore, at once be seen how difficult it
must be to express any definite opinion upon the future course of the
disease unless we are fairly cognisant of the seat and magnitude
of its cause. There is one factor which stands out pretty
clearly, and that is, that the disease in children, no matter what
has caused it, is much more favourable than in adults, and this
independently of the question of any particular form of treat-
ment. This statement, however, requires this qualification, that
if the tubercular peritonitis is only part of a general miliary
tuberculosis, as it so frequently is in children under one year,
the prognosis is naturally bad.

The existence of another factor also admits of a tolerably
explicit statement, that patients suffering from advanced tuber-
cular disease elsewhere, as, for instance, in the lungs, are not
likely to recover.

As can be well understood the question of treatment greatly
complicates the subject. For where the conventional constitu-
tional methods of treatment can be carried out to the utmost
possible advantage the prospects of ultimate cure are propor-
tionately greater than where such conditions are limited or
impossible, and as a corollary to this it may be stated that the
better the constitution originally and the better the family
history, still more hopeful must be the prospect.

Leaving out of consideration for the moment the possible
value of operative treatment, it may be said that the real gravity
of a case is directly proportional to the severity of the disease
in the part which has originated the peritonitis. I cannot
better illustrate this than by narrating a case of extensive

disease of the adnexa, which had evidently been the source of the tubercular peritonitis.

CASE XLIV. *Tubercular peritonitis ; laparotomy ; tubercular disease of the adnexa ; temporary improvement ; death.*

Mrs. F—, aged forty-two years, was admitted into the Victoria Infirmary in May, 1902. At the age of twenty she had evidently had symptoms of gastric ulcer, which appeared to have lingered on for about ten years. There was then a period of ten years in which she seemed to have enjoyed good health. A recrudescence of the dyspeptic symptoms, however, occurred. She would suffer pain, somewhat variable in its acuteness, coming on shortly after food, and invariably referred to the umbilical region. She occasionally vomited, but no blood had ever been seen in the vomit. Her bowels until about six weeks ago had been costive, and necessitated the use of aperients ; but more recently they had come to move regularly without medicine. No diarrhœa appeared to have existed at any time, but it was stated that she frequently passed slimy material.

Menstruation had been regular until five months ago, when a month later there was evidently an abortion from the severe flooding which occurred at the time. Since then she had not menstruated, but there had been some leucorrheal discharge. There was nothing of import-ance in the family history.

On admission she was noticed to be extremely thin, being little more than skin and bone. Her appearance was very cachectic, and her skin was of a dark sallow colour. On inspection of the abdomen a distinct peristalsis was occasionally seen over a small area around the um-bilicus ; with this exception neither palpation nor percussion could detect anything abnormal ; and on examination both by way of the vagina and the rectum nothing could be made out except a little deflec-tion of the uterus to the left side.

The abdomen was opened by a median incision, and immediately it was seen that the peritoneal coat of the whole bowel was studded with small whitish nodules. On examination of the pelvic viscera a matted mass which occupied the left fossa seemed to centre round the ovary of that side. Owing to the advanced emaciated condition of the patient nothing further was done. One of the small peritoneal nodules was excised and submitted to microscopical examination, the result of which was to prove its unequivocal tubercular nature. The patient re-mained in the Hospital for eight weeks, and left slightly improved. It was ascertained, however, that shortly after reaching home she com-menced to fail again, and gradually died from exhaustion.

It is more than likely that in this case there was some bowel

infection also, as indicated by the passage of slimy stools and the occasional attacks of peristalsis.. In any case the disease had got a much firmer hold upon the system generally than it was possible to overcome by any operation or constitutional treatment. As a general rule it will be found that where there is great emaciation there is very little chance of the system overcoming the disease, whatever be the remedial measures employed.

Another class of cases which admits of the worst possible prognosis is that where the tubercular peritonitis is dependent upon extensive and advanced ulceration of the bowel. In these patients there is usually an intractable diarrhœa, and so long as this continues little or no hope of recovery can be held out. Cases which present persistent high temperatures must be regarded as unfavourable. As already indicated such rise of temperature is usually significant of mixed infection ; and, as is well known with tuberculosis in other parts of the body, the infection of a tubercular lesion by septic micro-organisms augurs ill for the healing of the wound and the subsequent recovery of the patient.

In such cases as those above described death usually results from progressive asthenia, due to lardaceous disease or simple exhaustion from continuous depleting discharges.

When a pleurisy has preceded or been the cause of a tubercular peritonitis, Sutherland (25) expresses the opinion that the prognosis may be regarded as favourable.

So long as obvious evidences exist of tubercular peritonitis, the possibility of the disease lighting up elsewhere or of the intercurrence of other complications is an ever-present danger. For instance, intestinal obstruction may set in from paresis of the bowel due to the active inflammatory nature of the peritonitis, as already exhibited in Case XXXVIII. Johnson (26) records a case of tubercular peritonitis where a patient was suddenly seized with acute symptoms of obstruction. Laparotomy was performed and the cause discovered to be thrombosis of certain tributaries of the superior mesenteric vein, probably due to a deposit of tubercle which had taken place around them. The greatest danger, however, lies in diffusion of the disease. Either a general miliary tuberculosis may be set up, or some particular region, as, for instance, the brain, be infected. Kennedy (14) relates a case where, after being

under treatment for eight weeks, a general miliary tuberculosis developed, death resulting directly from tubercular meningitis. The following case is interesting in this particular respect, although the symptoms which originally presented were not those of tubercular peritonitis, but of subacute intestinal obstruction. As the operation showed, however, there was tubercular peritonitis present. Tubercular meningitis developed on the tenth day.

CASE XLV. *Tubercular peritonitis; subacute intestinal obstruction; laparotomy; adhesions; meningitis on tenth day.*

Jack C—, aged four years, was admitted to the Victoria Infirmary in September, 1905. The history given was that up to about three weeks ago he had had good health, but after that his appetite began to fail, and he would occasionally vomit. About four days before admission he was seized with severe abdominal pain which made him cry out. Since then the pain had been more or less continuous, and vomiting constant. The bowels were constipated, but about twelve hours previously it was stated that they had been opened by a dose of medicine. During some of the more acute attacks of pain the parents stated that they had noticed a bulging in the right flank about the size of a hen's egg. The family history was good.

On admission the child presented all the symptoms of subacute obstruction. The pulse was 120 and the temperature 97·2°F.; the abdomen was distended and tympanitic, and peristalsis was visible. In the right iliac fossa a resistent mass could be detected, dull to percussion.

The abdomen was opened over the area of dulness in the right iliac fossa. A coil of distended intestine at once presented. The peritoneum was seen to be studded with miliary tubercles, and there was a good deal of matting of parts. Some of the adhesions in the neighbourhood of the wound were separated, and one strong band—which might have been the cause of obstruction—was divided. Owing to the extensively involved condition of the parts, the state of the patient, and the possibility of the obstruction being relieved, nothing further was attempted. During the next eleven days the child remained in the hospital it suffered from intermittent attacks of abdominal spasm, causing pain and making it very restless. Flatus was passed, and the bowels made to move by the employment of enemata. On the tenth day marked twitchings of the fingers were noticed, and the child's irritability and restlessness became more marked. The pulse also was very variable, sometimes running up to 140. The symptoms suggested at the time some tubercular involvement of the brain or membranes. The child was removed by the parents from the Infirmary.

In venturing to forecast the future of those cases where more or less immediate recovery had taken place the possibility of symptoms arising from old adhesions has always to be borne in mind. The younger the patient infected the greater is the probability of complete absorption of the exudates, but in adults it is very doubtful whether a tubercular peritonitis ever so completely clears up as to leave no traces behind. Indeed, there are clear observations to show that not only may the patient be subject to the effects of adhesions, but that a fresh attack of the disease may be lighted up at any time. It is a somewhat striking fact how often in operations for intestinal obstruction due to old tubercular adhesions, miliary tubercles are found scattered about both on the peritoneal surface and on the adhesions themselves.

It may usually be regarded as symptomatic of the existence of adhesions when patients who at one time suffered from tubercular peritonitis are subject to inexplicable attacks of abdominal pain, often attributed to, and correctly, the consumption of certain articles of diet.

The bearing of operative intervention on the subject of prognosis introduces a factor of considerable moment, and one which modifies to some extent any opinions expressed without due regard to it. I think it better, however, to discuss the matter under the heading of "Treatment," for the relative merits of any particular method are naturally determined by the good they effect; and this, therefore, is essentially a matter which concerns treatment.

TREATMENT.

From all that has been said regarding the ætiology and pathology of tubercular peritonitis it will have become perfectly clear that the disease has to be viewed from a much broader standpoint than that of a condition whose chief and only seat is centred in the peritoneum. It is this wider aspect of the question, involving as it does many complicating factors, that so greatly mitigates the value of all statistics dealing with the supposed relative merits of different methods of treatment. For the same reason any attempt to generalise from success or failure in individual cases is liable to lead to particularly fallacious conclusions. Let me make my meaning quite clear by a

concrete example.   Take two cases of tubercular peritonitis which present abdominal distension with serous effusion.   Both are treated by laparotomy and simple removal of the serum. One at once progresses to complete recovery ; the other is little, if at all, benefited.   The former is an uncomplicated case of tubercular peritonitis, possibly primary in its origin ; the other is dependent upon some advanced focus of disease, say in the intestine.   To generalise from either the one or the other would be obviously incorrect so far as it concerns the perform- ance of simple laparotomy.   But the presence or absence of a primary lesion is only one factor among many that affects the issue of any particular method of treatment; for a disease such as tuberculosis is both local and general, and the inci- dences of age and predisposition are in themselves no mean factors in determining the natural course of the disease, and its amenability to treatment.

The object of these introductory remarks is to indicate with what caution we must regard the supposed virtues of any particular remedy or line of treatment.   And equally also to place us on our guard with regard to the supposed merits of any particular measure, when other agencies are at work, to which with possibly more justice might be attributed the success.   It is impossible not to be struck, in studying the literature of the subject, and in carefully scrutinising the records of supposed success due to particular methods of treat- ment, how often there is an utter disregard for all other agencies in the case beyond the one whose virtues are being extolled.   There is little doubt that in this particular respect laparotomy itself has often merited justly this imputation, and that the supposed good effected by opening the abdomen has really rested on the various measures adopted both before and after the operation.   However, I do not intend discussing the merits of operative intervention until I have given some of the measures of a purely conservative kind which should be employed in practically all cases before the question of operation is entertained.

Non-Operative Procedures.

There stands pre-eminently first the combating of the disease by every possible means that will raise the resisting

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powers of the body. No matter what the primary cause of tubercular peritonitis there is as much reason to fight it constitutionally as there is when the lungs are the principal seats of infection. Every effort, therefore, must be exercised along those lines which it is the custom to traverse when the disease is being fought in other regions of the body.

In attempting to single out some of the various local measures that have been employed, primary importance must be attached to those which seek to deal in the first place with the possible infecting focus. If, for instance, we have reason to suppose that there is tubercular ulceration of the bowel attention should be as much directed to this as to the peritonitis which is its direct result. In treating such a case Yeo (27) advises the outward application of iodoform ointment and the internal administration of small doses of iodine and creasote three times a day. His employment of iodine in some form is based on the belief that some of the iodine is secreted into the serous cavity just as it can be shown to be passed readily by other secretions. In time, therefore, the fluid in the peritoneal cavity becomes highly charged with iodine compounds sufficiently to act as an antitoxin to the tubercle toxin, or as anti-bacterial to the bacilli. Miserochi (44) also testifies to the value of iodine used both externally and internally. The use of creasote on the other hand is to render the fæces as little irritating as possible to the bowel, and so together with the careful selection of simple nutritious food to help in healing the ulceration. Judging by Yeo's experience and that of many others who have employed much the same formulæ, good results have been attained.

Various other ingredients have been used for purposes of inunction such as oils, ointments and emulsions of various kinds; it seems doubtful, however, whether the rest, dieting and good hygienic surroundings have not often much more to do with the favourable issue than these local applications to the abdominal parietes. As Byford (28), probably quite correctly, states, " the essential factor in the treatment is through due regard to the alimentary canal to destroy the sources of local irritation and leave Nature to do the rest." He instances a case where " from the time the patient was put upon strictly liquid diet, salines and salol, improvement was reached and sustained."

Apart from the employment of the ordinary pharmaceutical preparations various other measures have been adopted with more or less success. The following may be instanced as one example founded on a rational physiological basis. The method is described by Knox (29), who thus put it into practice. A patient suffering from tubercular peritonitis had resisted for months ordinary medical treatment. The abdomen was firmly strapped and from that time onwards improvement was immediate and marked. The success of the treatment is attributed by the author to the restriction of the abdominal movements and the mechanical support of the abdominal muscles. The result of this is that thoracic respiration and aspiration is exaggerated, and so lymphatic absorption increased and the fluid removed. The same line of treatment was carried out in a case recorded by Cæsar (30). A girl, aged seven years, had an abdomen so distended that she could not see her toes. A flannel bandage and mercurial inunction to the abdomen were applied; iodide of potassium and bark were given internally, and the child made to rest in bed. "In one month she was running about quite well, with the exception of the enlarged glands."

The X rays have naturally been tried and apparently in some cases with success. Dodson (31) states that " in a number of cases of tubercular peritonitis in adults in the Presbyterian Hospital in Chicago, the X ray has been used with very gratifying results. There has been a subsidence of tenderness and pain, and a disappearance of the effusion and of the fever."

The curative merits of tuberculin injection have received considerable impetus from Wright's recent work. The value of this treatment as it concerns tuberculosis generally will be referred to in the last chapter of this book. Of its possible worth in this particular condition I cannot, perhaps, do better than relate the case in full which Sir Almroth Wright (32) gave in illustration of his remarks when addressing the French physicians and surgeons on the occasion of their visit to London in October, 1904.

CASE XLVI. *Tubercular peritonitis; laparotomy; no improvement; tuberculin inoculation; cure.*

A woman, aged thirty-three years, was admitted to St. Mary's Hospital in January, 1903, for abdominal pain and distension, asso-

ciated with fever and loss of weight. These symptoms had been first noticed in the previous September. She was operated upon on January 22nd, the abdomen being opened by an incision five inches in length. The typical appearances of tubercular peritonitis were brought into view, and the surfaces of the intestine were seen to be in places studded with miliary tubercles. After the evacuation of a very considerable quantity of fluid the peritoneum was washed out and the wound was closed, a drainage-tube being left in position.

After the operation the fever still continued. It reached 102° F. every evening during the first week, it reached 101° F. every evening for the next fortnight, and it still reached up to 100° F. every evening two months after the operation. All this time the wound was continuing to discharge, and the patient was becoming very weak and emaciated—being quite unable to turn unassisted in bed.

Treatment by tuberculin inoculation was begun on March 17th. Within a few days the evening temperature had sunk away to 99° F., and it came down to the normal on April 28th, and remained normal (except when slightly disturbed by certain of the tuberculin inoculations) for the three months which the patient still spent in Hospital. From the beginning of the tuberculin treatment onwards the patient improved in strength and put on flesh. In June she was able to sit up in the afternoons. Her body weight was now 105 lb. In July she was discharged from hospital, the abdominal wound having now completely healed, except for a narrow sinus. The tuberculin treatment was continued, the patient being treated first at home and afterwards as an out-patient.

Six months afterwards the sinus had completely closed, and the patient's weight had, by March, 1904, increased to 132 lb. She had, in other words, increased 27 lb. in weight in six months, and had passed, within a year, from a seemingly desperate condition to a condition, as Sir Almroth pointed out, of what he considered perfect health.

Although the details of the treatment in this case are not given, it is to be understood that they were based on a careful and continuous observation of the opsonic index.

Riviere (51), in a paper read at the Annual Meeting of the British Medical Association at Exeter, in August, 1907, discussed the value of tuberculin as it applied more particularly to the disease in children. He stated : " Nearly all my cases of tuberculous peritonitis improved rapidly ; one child had been persistently going downhill for many months on ordinary medical treatment and was regarded as a hopeless case.

Directly tuberculin was given she became cheerful, and her weight rose from 1 st. 11 lb. on October 26th last to 3 st. 2 lb. on July 12th.   She is now practically well and still progresses at the rate of nearly $\frac{3}{4}$ lb. weekly.   As a result of clinical experience, I would say that general symptoms and a fluctuating or high opsonic index are in themselves no bar to tuberculin treatment.   The condition most unpromising for success of any I know is marked wasting, and, of course, in cases obviously beyond cure tuberculin must not be expected to achieve the impossible."

With regard to the details of treatment, he gives the following instructions : " As the result of personal experience, I now consider $\frac{1}{12000}$ to $\frac{1}{8000}$ mg. suitable for a child of one year, $\frac{1}{4000}$ mg. for a child of five years, and $\frac{1}{3000}$ mg. for children of ten or twelve years.   These doses suit average cases, but the effect on the opsonic index should be watched, and, a convenient dose being fixed, this is best given every two weeks during the progress of the case.   I consider it important, even with a knowledge of average dosage, that the opsonic index should be watched during tuberculin administration in children."

OPERATIVE PROCEDURES.

The simplest form of operative procedure is that of tapping, and applies, therefore, only to cases in which there is effusion. Still further, the application must be limited to cases of comparatively excessive effusion, where it is certain that the trocar will enter only the fluid.   Herein lies the chief objection to this method—the risk incurred of penetrating the intestine. Aside from this, however, it is very uncertain.   In some few recorded cases success has apparently followed, but more often than not the fluid has re-accumulated.

Wynter (33) succeeded in a very refractory case by injecting adrenalin.   The case was that of a girl, aged twenty-three years, who was tapped once and the abdomen opened twice, but the fluid re-collected.   He withdrew the fluid through a cannula, and then injected adrenalin into the abdominal cavity— three drachms of a 1-in-1000 solution of adrenalin.   There was no further accumulation, and in four months the patient was in a good state of nutrition.   The laparotomy showed evidences of tubercular peritonitis and tubercular mesenteric glands.

Schömann (34), by single or repeated injections of a 5 per cent. glycerine emulsion of iodoform, successfully treated seven cases in the course of from three to ten weeks.

Since König (35), in 1884, proposed laparotomy for the treatment of tubercular peritonitis, there has been an ever-increasing mass of literature dealing with the subject. While surgery at one time seemed to have usurped the position of medicine, and claimed for its intervention an almost exclusive right, experience is bringing about a saner and more correct appreciation of the merits of both, and proving that, while medicine has a very distinct part to play, surgery is equally useful, if not sometimes even more so, at particular phases in the progress of the disease.

The fact being acknowledged that laparotomy, when employed in suitable cases, does benefit the patient, soon led to a number of theories regarding the particular means which were the possible cause of the success. To simply open the abdomen and close it again and find that good had been effected was, to say the least of it, somewhat surprising. As a matter of fact, however, the procedure is rarely so simple, for a variable amount of manipulation is usually exercised, not to mention, also, the occasional washing or mopping out of the cavity, and, by some, the introduction of various kinds of medicants such as iodo-form, or iodoform emulsion. As, however, no certain explana-tion is forthcoming, I must give some of the theories held as possibly explanatory of the cure of the disease.

Lauenstein attributed the good result to the removal of the fluid and the admission of light. Mosetig-Moorhof considered that the entrance of air into the peritoneal cavity was the explanation, and Nolan held the same opinion, based upon the more confirmatory evidence that he had cured some cases by pumping sterilised air into the peritoneal cavity.

Marcy (36) states, as an explanation of the good results accruing from laparotomy, that it is due to " the stimulating effect of the exposure of the peritoneal surfaces to the air, the mechanic stimulation of sponging, the chemic effect of medica-menta, e. g. mercuric solution, iodoform, etc. All such measures greatly increase the leucocytes. The leucocytes act as phago-cytes, and by blocking the lymph channels check further invasion."

McBurney (37) believes the benefit of the operation to be

due to the change in the vascular supply of the diseased tissues. Pressure being relieved, the tissues receive a larger supply of fresh blood.

Hildebrand (38) also adopts the vascular theory, only he goes a little further and considers that the irritation of the part during the operation quickens absorption.

Alexis Thompson (45) considers that the simple matter of making a wound through the wall of the belly, and the attendant manipulation of the parts concerned, effects some beneficial influence.

Watson Cheyne's (39) theory is that after the removal of the fluid from the peritoneal cavity by incision, serum, having antibacterial properties, may be poured out, and so the morbid process be arrested.

Byford (29) thinks that more importance is to be attached to the preparation and after-treatment entailed in all abdominal sections than to the operation itself.

Wright and Douglas (40) found that the fluid contained in the peritoneal cavity was sometimes poorer in protective substances than the patient's blood. As an inference from this they put forward the suggestion, " that the evacuation of the old and stagnant lymph and the transudation of new and potent lymph from the blood-vessels furnished the probable explanation of the advantages " following the evacuation of the ascitic fluid.

It is not possible to draw any positive conclusion regarding any one of these theories being more truly explanatory than another. There is this fact, however, that the cases in which success is most marked are those in which fluid is taken away ; so that it would seem as if removal of some toxic agent gave the tissues a greater chance of overcoming such of the virus as remains.

The question of most importance is naturally that which concerns the best and most suitable cases for treatment by laparotomy.

Watson Cheyne (39) in his Harveian Lectures " On the Treatment of Tubercular Diseases in their Surgical Aspects," says, in speaking of tubercular peritonitis : " All, even the gravest forms, show some good results, and there is no form in which we can say that laparotomy is absolutely useless." He states that he has had " successes in the ' dry ' form as well as

in the 'ascitic.'" This somewhat extreme view of the value of laparotomy is far from being held by all surgeons; nevertheless there are not wanting some very remarkable illustrations of what might be deemed practically hopeless cases and quite unsuitable in the estimation of many operators. I will give just one example of such an advanced case recorded by Ochsner (41): "I operated," he says, "upon a married woman aged twenty-six years, whose ovaries, tubes and uterus were embedded in a thick mass of tubercular tissue, so extensive that it seemed absolutely useless to attempt its removal. The cæcum, omentum, and the small intestine were also matted together. The entire intestinal and parietal peritoneum were thickly studded with miliary tubercles. The remaining abdominal space was greatly distended with fluid, and I simply inserted a drainage-tube in the hope of giving the patient a slight amount of temporary relief, and closed the remaining portion of the abdominal wound. She recovered slowly, but was able to return to her home in six weeks. It is now eleven years since I performed this operation, and the patient is a strong, healthy woman, and has given birth to two healthy children."

The two classes of cases considered by most surgeons as the best suited for laparotomy are serous effusions without adhesions and localised collections of fluid. In the former class it is assumed that a reasonable attempt has been made to effect a cure by the ordinary anti-tubercular remedies, for it is in this class of case also, especially with children, that simple treatment is frequently successful. When, however, medicine fails, laparotomy sometimes succeeds.

It may be reasonably asked how long should purely medical treatment be continued before the question of operation is entertained? Shattuck (46), in attempting to answer the question, gives it as his opinion that a month or six weeks, or even less, should intervene. The best criterion, however, will probably be the condition of the patient. That is to say, that quite irrespective of time, the slightest signs of improvement should be taken as an indication for the continuance of conservative measures; while symptoms of retrogression should be equally accepted as suggestive of operation.

It is not merely the existence of fluid that determines the advisability of laparotomy, but its persistence. To open the abdomen at too early a period is more likely to do harm than

good.   Ochsner (8), in discussing this aspect of the question, says : "Experimental work on animals by several observers showed that an early artificial tuberculosis did not improve with drainage to the extent that the cases did in which they allowed the tubercular peritonitis to become chronic.   Those that were older recovered more rapidly with drainage than those that were operated upon early, and the explanation was that these animals developed certain conditions which enabled them to manufacture their own antitoxin out of the residue of their tuberculosis after drainage had been established."

But a very striking example has occurred in my own practice, and is worth, I think, recording in full.   I was asked to see the case in consultation with Drs. Andrew Tindal and Arnold Jones.   We thought it possible that the case was one of appendicitis, although, as the history will show, there was a want somewhat of distinctiveness about the symptoms.   Personally, I felt disposed to delay operating, but the case was some five-and-thirty miles from Glasgow, so that we considered it wiser on the whole to explore the appendicular region.

CASE XLVII.   *Tubercular peritonitis; early laparotomy; temporary improvement, then retrogression; subsequent recovery.*

A. B—, aged sixteen years, a strong, well-built lad, was out riding on horse-back, feeling at the time quite well.   On his return, however, he complained of pain in his back.   This passed off, but on the following day he felt pain in the abdomen in the region of the umbilicus.   This gradually got worse, until, on the fourth day after the onset of his symptoms, he was obliged, on returning from his business, to go to bed.   Two days later he was seen by Dr. Jones, who discovered general abdominal tenderness and tympanites, more marked, however, in the right iliac fossa.   He also observed that examination *per rectum* caused pain.   His pulse was 100 and temperature 101° F.   He had no appetite, his tongue was furred and his breath offensive.   As regards his past history, he stated that he had had three distinct attacks of pain in the right iliac fossa, and for several months had noticed that his abdomen would occasionally swell up, but only for a few · hours. He had never vomited, nor had he ever suffered from diarrhœa; on the other hand, he was inclined to be costive.   His lungs were normal.   His family history was particularly good, father, mother, brothers and sisters all being robust.   At the time when I saw him— it was on the morning of the ninth day of his illness—he had a slightly heavy, lethargic look about him, but with some colour in his face.   He

did not complain of pain, but his abdomen was somewhat livid in appearance and tender to deep pressure in any part. There was no swelling or resistance in the right iliac fossa, the tenderness being no more marked there than elsewhere. His temperature was 99·4° F. and his pulse 100. Dr. Jones, who had been in constant attendance, was distinctly of opinion that he was getting worse.

I opened the abdomen in the right iliac region. Immediately the peritoneum was incised about four pints of straw-coloured fluid escaped. The intestines were injected but not distended, and presented in places a somewhat granulated surface, suggestive of an early tubercular infection. The vermiform appendix, which appeared infected and swollen somewhat like the small intestine, was removed. The wound was completely closed.

For a week there were signs of improvement, the temperature returning to normal. It then, however, commenced to rise again, and for four or five weeks it reached 100° F. and 101° F. in the evenings, falling to normal in the morning. During this time he distinctly lost ground, losing weight and looking ill. The abdomen did not swell as if fluid re-accumulated, but the wound took on a tubercular action, and continued to discharge for some time. However, as the result of careful feeding and medical treatment, improvement again set in, the temperature returning to normal, and the lad's condition generally showing signs of permanent recovery. The appendix and some of the fluid were submitted to Dr. John Anderson for examination, who reported as follows : " The appendix was opened up when received ; it showed a raised condition of the mucosa, with no evidence of ulceration or strictures. Areas of hæmorrhage (petechial) were noted at several places, and the entire organ was congested. A microscopical examination of different parts was made, and the same condition in all was recognised. The tubular glands were well preserved, but around some an intense lymphocyte infiltration was noted. The adenoid follicles were enlarged and packed with lymphoid cells—aggregations of lymphoid cells were also present scattered through the mucosa and submucosa, and a round-celled infiltration with new-formed connective tissue was present in the muscular tunic. The vessels were congested, and extravasations of blood into the tissues were noted. The meso-appendix was deeply congested and the seat of round-celled infiltration. On the serous surface groups of epithelioid cells with round cells were noted, suggesting a tuberculous condition ; and one or two giant-cells were made out. The appearance of the appendix otherwise was that of an acute attack of catarrhal appendicitis. The fluid presented the characters of an inflammatory ascites, and films prepared after centrifugalising were examined for organisms. No pyogenic organisms nor tubercle bacilli could be found. The cells present in the fluid were

chiefly of the nature of the mononuclear (small) lymphocyte, with a few polymorphonuclear cells, and a number of larger desquamated endothelial cells."

I think this case fairly demonstrates the inadvisability of operating before Nature has herself had time to erect her own protective barriers. It must hamper, if it does not actually check, repair to inflict a surgical wound; but it may go still further and be the direct means of assisting the insurgents by weakening the citadel. Such seems to have been the result of prematurely opening the abdomen in the above case, for the wound itself became attacked, and the patient for a time showed distinct symptoms of retrogression. In striking contrast to this case and in illustration of the success which may follow laparotomy under favourable and suitable circumstances, I may quote a case reported by Abbe (42). Before doing so, however, there are one or two points of practical detail which may be referred to in connection with the operation when employed for cases of simple uncomplicated serous effusion.

By all operators it is agreed that no drainage should be used if it can be possibly dispensed with. The result of employing a tube is the almost certain infection of the wound with tubercle, and the lingering after-effects, therefore, of an intractable discharging sinus. As regards other details in the performance of laparotomy for simple serous effusion, the question whether the cavity should be dry mopped or flushed with some solution, either simple or medicated, seems to be of very little moment, for both methods have been employed with success. The same appears to be the case also with regard to the insertion into the cavity of some anti-bacterial medium, such as iodoform, pure or in combination.

It may not be out of place to add here a very pertinent practical suggestion made by White (43) with regard to the employment of tuberculin in conjunction with the operation of laparotomy. If the inoculation of tuberculin is to play in the future a prominent and permanent part in the general treatment of tuberculosis, then its use in association with operation may be of the greatest value. White expressed the opinion that in future the treatment of tubercular peritonitis would consist in raising the opsonic index prior to operation, and subsequently, after the effect of the auto-inoculation produced by

the operatión had passed off, in keeping the index high by suitably interspaced inoculation, until the local condition was quite healed.

CASE XLVIII. *Tubercular peritonitis ; repeated tappings ; no improvement ; progressive emaciation ; laparotomy ; immediate improvement.*

" A woman, aged twenty-five years, had had three strong children, and had been in good health until six months prior to coming under observation. She then began to fail, and her abdomen swelled rather rapidly. A few weeks later she was tapped and a pailful of straw-coloured fluid removed. One month later two pailfuls were removed, and this was repeated in a month. She had had no pain and maintained a fair appetite, but lost twenty pounds during the decline. Two months later rectal prolapse occurred and persisted. She had had a dry cough for years. On admission to St. Luke's Hospital, in June, she was in an emaciated condition with cough. Her left chest contained fluid, from which two pints of turbid serum were aspirated. Respiration was rapid and laboured. The abdomen was also distended with ascites. Diagnosis of tubercular peritonitis was made, and inasmuch as the patient was in no condition to bear ether anæsthesia, Dr. Abbe made an abdominal section in the median line below the navel, under cocaine anæsthesia. Through a three-inch incision one or two gallons of ascitic fluid was evacuated, and the general abdominal cavity freely flushed with warm saline solution. The peritoneum, both parietal and visceral, was found studded with miliary tubercles, portions of which were excised for examination. The patient bore the flushing and operation with composure, and little or no pain, aiding the procedure by turning on her side to complete the final drainage. After removal from the operating room to the ward she had a chill lasting forty-five minutes, but little or no fever. Her abdomen was somewhat tympanitic for two days, but this soon disappeared. Light diet was allowed the second day. Rapid convalescence occurred without incident, and she left the hospital apparently well on the seventeenth day after operation. Since then her health has been excellent; no fluid has reaccumulated, and she has reached the greatest weight of her life, having increased from 106 to 132 lb." (Robert Abbe, ' Annals of Surgery,' 1897, vol. xxv, p. 737.) (See also Case XXXVIII.)

There are many cases where, if we are to reach that complete success which is to be hoped for in laparotomy, we must do something more than merely open the abdomen, dry swab or flush, dust with iodoform, or treat in some such other way. We must remove the infecting focus when such exists, as the

primary cause of the peritonitis. If ulceration or stricture of the bowel co-exists with the peritonitis, the involved segment of the intestine should be excised. Similarly, if the adnexa are at fault, they should be removed. The cases recorded by Mayo (1) strikingly illustrate these facts. They have already been referred to when discussing the subject of tubercular salpingitis. In these particular cases the tubercular peritonitis was due to primary disease of the Fallopian tubes. They had been operated upon from one to four times, but it was not until the tubes were removed that a permanently successful result was reached.

It will frequently happen that the abdomen will be opened for some other condition than that where the presence of fluid is the most prominent symptom, and the question will then arise, to what length should we go in our efforts to deal with the lesions present ? Every individual case must be treated on its own merits, but there is one universal rule which may be laid down as binding on almost every case where ex- tensive and intimate intestinal adhesions exist. To forcibly detach or separate coils of intestine bound together by firm adhesions is to run the gravest possible risks. It is often much easier to lacerate the delicate serous coat of the intestine than it is to break through the fibrous connection. The almost inevitable result of such an injury to the bowel wall is the production of a septic peritonitis. Perhaps the force of these observations will be best brought home by the narration of a case. Failures frequently teach more than successes, and the lessons learnt are often proportionately greater by reason of the influence they exert in the prevention of similar and worse errors in the future. While, therefore, it would have been wiser to have desisted from any extended efforts in this particular case, the result, unfavourable as it was, is certainly instructive.

CASE XLIX. *Tubercular peritonitis ; localised matting and distension of intestines forming a tumour; laparotomy; partial separation of adhesions ; suppurative peritonitis ; death.*

Mrs. M—, aged thirty-five years, was admitted to the Victoria Infirmary in December, 1904. Her illness commenced, about nine months before admission, with pain in the left side of the abdomen. Since that time the pain had varied much in character, sometimes being

of a sharp and cutting nature, and felt most when getting about on her feet; she stated, however, that she had had three attacks of pain, at different intervals, over the whole abdomen, accompanied with sickness and vomiting for two or three days. The last of these attacks was the most severe, and kept her in bed for nearly seven weeks. The abdomen is stated at this time to have been much distended and hard. There had been no menstrual disturbances, but leucorrhœa had become a symptom during the latter two years. She had suffered for six or seven weeks before coming into the hospital from dysuria, and a feeling of pressure on the bladder, but there had been no frequency of micturition. Her bowels were constipated, and she was obliged to take aperients to obtain a movement. She had been married for twelve years, but had never been pregnant. She had got much thinner and weaker.

On admission the patient was seen to be very thin and pale; both pulse and temperature were normal; tongue clean. Examination of the abdomen revealed distension, more especially below the umbilicus. The skin showed a general dark purple mottling. There was marked rigidity of the entire abdominal wall, rendering any deep palpation of parts impossible. More or less dulness to percussion existed all over the abdomen, with no alteration in change of position of the patient. A percussion wave could be detected from the one side of the lower abdomen to the other. Digital examination by the vagina revealed a firmly-fixed and quite immobile uterus, and also the sense of a firm smooth swelling in the right fornix. The rigidity of the abdomen prevented any bimanual examination. The thoracic organs were normal. Catheter specimens of the urine, examined on several occasions, showed it to contain albumen and some pus cells; often, also, little more than a pint was passed in the twenty-four hours. A preliminary examination was made under chloroform, when there was detected what was supposed to be a movable tumour, somewhat indefinite in shape, in the lumbar region. While not observed to bulge much into the flank, it was felt to project into the pouch of Douglas, where it seemed to be separate from the uterus.

On cutting through the parietes the subperitoneal tissues were found œdematous, and on opening the peritoneal cavity clear fluid escaped. This, on further separation of the parts, appeared to come from spaces formed by adherent coils of intestine. These latter were in places so glued together that separation was impossible. The visceral and parietal coats of the peritoneum were greatly thickened, œdematous, pale, and granular-looking. It was then discovered that what had been previously considered as a tumour on external examination consisted solely of distended small intestine with enormously thickened tunics, inseparably matted together. The hand, when inserted into the

abdominal cavity, detected a similar matting of the bowel in other parts, but not the same amount of distension. It was not possible to differentiate any of the organs, either pelvic or abdominal, so that the possible source of peritoneal invasion could not be determined.

The patient recovered from the operation, and as all seemed to be doing well the stitches were removed on the ninth day after operation; but immediately following this removal some gas escaped from the upper end of the wound, accompanied by a little thick pus, and later, fæcal matter. This condition gradually increased until the patient died eight days later, that is, about a fortnight from the date of the operation.

At the *post-mortem* made by Dr. John Anderson a general purulent peritonitis was discovered, with escape of fæcal matter into the peritoneal cavity. The coils of the intestine were greatly matted together, and were unravelled with much difficulty. In addition to the recent purulent exudate on the surface of the bowel, and the compartments of pus shut off by the adherent coils of intestine, there were chronic fibrous adhesions. When the exudate was stripped from the serous coat of the bowel tubercles were seen in fair numbers. The mesenteric glands were also found buried in the adhesions, and closed in by loops of intestines; when cut into they showed enlargement and caseation. The intestine was examined throughout, but no ulceration of its mucous membrane was found. With the exception of the ovaries and tubes, which were buried in an inextricable mass of adhesions, no other intra-abdominal organs manifested signs of tubercular disease.

I have purposely refrained from giving statistics for reasons already stated. Many have been published with the object of showing the supposed advantages of laparotomy over purely medical treatment, and *vice versâ*. Thus, to give only a few examples as culled from Syms' (47) exhaustive discussion of the subject. Borchgrewink (48) bases his conclusions on a study of forty cases. Of twenty-two operative cases, eight were light, six moderately severe, and eight severe. Fourteen, or 63·3 per cent., recovered, and eight, or 36·4 per cent., died. Of seventeen patients treated without operation, fourteen, or 82 per cent., recovered and remained well for two or three years. The natural conclusion from such statistics would, therefore, be that more patients recovered without operation than with it.

Elestratov (49) reviewed the statistics of a number of writers, and found that 31·6 per cent. of 136 cases recovered under medical treatment, and that 78·3 per cent. of 240 cases

recovered after operation. Therefore, operation cured more than double the number of the patients than had been treated solely medically.

Shattuck (46) analysed the histories of ninety-eight cases of tubercular peritonitis treated in the medical and surgical wards of Massachusetts Hospital from 1889 to 1900. Of forty-six cases treated without operation, seven died in the Hospital; while of fifty-two surgical cases, six died in the Hospital. Medical and surgical treatment, therefore, effected practically similar results.

Enough has been given to show how useless such comparisons are in the face of a condition so complicated and so multifarious in its considerations as tubercular peritonitis. Each case must be treated on its own merits; and the only conclusion it seems at all possible to arrive at is that, after medical and dietetic measures have been employed for a reasonable time and no marked improvement observed, laparotomy should be performed, and this entirely apart from any consideration regarding the nature of the lesion. The simpler the condition, as indicated, for instance, by an uncomplicated serous effusion, the more likely is opening of the abdomen and removal of the fluid to be successful. On the other hand, there is ample evidence to show that even in apparently the most hopeless cases simple exploratory laparotomy has been followed with the best results.

AUTHORS REFERRED TO.

1. W. J. MAYO.—'Journ. of the Amer. Med. Assoc.,' 1905, vol. xliv, p. 1158.
2. BORSCHKE.—Virchow's 'Archiv,' vol. cxxvii, p. 121.
3. THEODORE FISHER.—'Lancet,' 1903, vol. i, p. 173.
4. T. M. ROTCH.—'Journ. of the Amer. Med. Assoc.,' 1903, vol. xl, p. 71.
5. VIERORDT.—Quoted by Lobingier, 'New York Med. Journ.,' 1903, vol. lxxviii, p. 1077.
6. DEBROKLOUSKY.—'Manuel de Path. Interne,' seventh edition, vol. ii, p. 608.
7. S. C. PLUMMER.—'Annals of Surgery,' 1906, vol. xliii, p. 793.
8. A. J. OCHSNER.—Ibid., 1906, vol. xliii, p. 797.
9. ALDIBERT.—'Thèse de Paris,' 1862.
10. SIR FRED. TREVES.—'Annals of Surgery,' 1894, vol. xix, p. 623.
11. J. ISRAEL.—'Deutsch. med. Wochenschr.,' 1896, vol. xxii, p. 5.
12. E. W. ANDREWS.—'Annals of Surgery,' 1901, vol. xxxiv, p. 787.
13. CUTHBERT WALLACE.—'Trans. Med. Soc. Lond.,' 1906, vol. xxix, p. 401.
14. A. E. KENNEDY.—'Lancet,' 1900, vol. ii, p. 581.
15. EDMUND OWEN.—Ibid., 1902, vol. ii, p. 1106.
16. HOWARD KELLY.—'Operative Gynæcology,' 1898, vol. ii, p. 139.

17. W. P. S. Branson.—' Trans. Med.-Chir. Soc. Lond.,' 1905, vol. lxxxviii, p. 349.
18. J. Porter Parkinson.—' Lancet,' 1903, vol. i, p. 173.
19. Daniel N. Eisendrath.—' Annals of Surgery,' 1906, vol. xliii, p. 795.
20. William Osler.—'Principles and Practice of Medicine,' third edition, p. 287.
21. Charles T. Parkes.—' Annals of Surgery,' 1906, vol. xliii, p. 801.
22. Charles K. Briddon.—Ibid., 1897, vol. xxv, p. 738.
23. Bayard Holmes.—Ibid., 1906, vol. xliii, p. 801.
24. Margaret T. Shutt.—' Journ. of the Amer. Med. Assoc.,' 1903, vol. xl, p. 73.
25. G. A. Sutherland.—' Lancet,' 1903, vol. i, p. 173.
26. Raymond Johnson.—' Trans. Clin. Soc. Lond.,' 1898, vol. xxxi, p. 212.
27. J. Burney Yeo.—' Lancet,' 1901, vol. i, p. 765.
28. Henry T. Byford.—' Annals of Surgery,' 1899, vol. xxx, p. 253.
29. Robert Knox.—' Lancet,' 1902, vol. ii, p. 989.
30. Julius Cæsar.—Ibid., 1902, vol. ii, p. 1660.
31. J. M. Dodson.—' Journ. of the Amer. Med. Assoc.,' 1903, vol. xl, p. 73.
32. Sir Almroth E. Wright.—'The Clinical Journal,' November 9th, 1904.
33. Essex Wynter.—' Trans. Med. Soc. Lond.,' 1906, vol. xxix, p. 401.
34. Schömann.—' Centralbl. f. Chirurg.,' 1904, p. 1409.
35. König.—Ibid., 1884, No. 6; and 1890, No. 35, p. 657.
36. Henry O. Marcy.—' Annals of Surgery,' 1905, vol. xlii, p. 755.
37. McBurney.—Ibid., 1897, vol. xxv, p. 739.
38. Hildebrand.—' Münch. med. Wochenschr.,' 1898, Nos. 51 and 52.
39. Watson Cheyne.—' Lancet,' 1899, vol. ii, p. 1724; also ' Harveian Lectures,' 1900.
40. Sir A. E. Wright and Capt. Douglas.—'The Clinical Journal,' 1904; also ' Lancet,' 1907, vol. ii, p. 495.
41. A. J. Ochsner.—'Trans. of the Amer. Surg. Assoc.,' 1902, vol. xx, p. 195.
42. Robert Abbe.—' Annals of Surgery,' 1897, vol. xxv, p. 737.
43. G. B. White.—' Brit. Med. Journ.,' 1906, vol. i, p. 623.
44. Miserochi.—Abstract, ' Journ. of the Amer. Med. Assoc.,' February 27th, 1904.
45. Alexis Thomson.—' The Practitioner,' 1895, N.S., vol. ii, p. 440.
46. Shattuck.—' Journ. of the Amer. Med. Sci.,' July, 1902.
47. Parker Syms.—' Annals of Surgery,' 1907, vol. xlvi, p. 95.
48. Borchgrewink.—' Bibliothecq. Medico. Artheil. E. Chir.,' H. 4, Stuttgart, 1901.
49. Elestratov.—' Journ. of the Amer. Med. Assoc.,' January 11th, 1902.
50. Murphy.—' Amer. Journ. of Obstetrics,' 1903, vol. xlviii, December; and 1904, vol. xlix, February.
51. Clive Riviere.—' Brit. Med. Journ.,' 1907, vol. ii, p. 1131; and vol. i, p. 861.

Other References.

G. W. Davis.—' Lancet,' 1901, vol. i, p. 317.
Arthur C. Roper.—Ibid., 1901, vol. i, p. 1129.
Blair Bell.—Ibid., vol. i, p. 862.
Guthrie.—' Archives of Pediatrics,' April, 1903.
Arcangeli.—' Il Policlinico,' September, 1899.
Zesas.—' Annals of Gyn. and Pediatrics,' September, 1903.
McMurtry.—Ibid., February, 1904; also ' Journ. of the Amer. Med. Assoc.,' February 27th, 1904.

EICHBERG.—'Journ. of the Amer. Med. Assoc.,' October 3rd, 1903.

MILES AND PORTER.—*Ibid.*, September 13th, 1902.

C. H. MAYO.—*Ibid.*, November 12th, 1904; also 'The Dominion Med. Monthly,' October, 1904.

PAGENSTECHER.—'Deutsch. Zeitsch. f. Chir.,' Bd. lxvii.

THOENES.—*Ibid.*, Bd. lxx, S. 505; also 'Centralbl. f. Chir.,' 1902.

SCHWARZ.—*Ibid.*, 1903, No. 209.

DOERFLER.—*Ibid.*, 1903, No. 535.

KÖPPEN.—*Ibid.*, 1903; also Langenbeck's 'Archiv,' 1903, Bd. lxix, Heft 4.

W. L. GRANT.—'Philadelphia Medical Journ.,' 1900, December 1st.

RICHARDSON.—*Ibid.*

M. OSSIAS.—*Ibid.*

DENNIS.—*Ibid.*, 1899, September.

FAIRCHILD.—*Ibid.*, 1903, April 18th.

SALVOLINI.—'Clinica Med. Ital.,' 1899.

G. D. MILLER.—'Medical Record,' 1900, July 14th.

JOHN B. BOUCHER.—*Ibid.*, 1906, p. 450.

THEODORE FISHER.—'Brit. Med. Journ.,' 1903, vol. i, p. 81.

E. CAUTLEY.—*Ibid.*

JAMES BARR.—*Ibid.*

JAMES CARMICHAEL.—*Ibid.*

ALEXANDER MILES.—*Ibid.*, 1902, vol. i, p. 18.

R. H. HODGSON.—*Ibid.*, 1899, vol. ii, p. 1420.

LEONARD GAMGEE.—*Ibid.*, 1898, vol. i, p. 374.

C. AVERILL.—*Ibid.*, 1897, vol. i, p. 142.

MACDONALD.—*Ibid.*, p. 790.

LEJARS.—'Progrès Médicale,' 1898, December 7th.

BIAGI.—'Gaz. degli Osped.,' 1900, December 2nd.

HALSTEAD.—'American Medicine,' 1903, January 31st.

R. G. LE CONTE.—'Annals of Surgery,' 1901, vol. xxxiii, p. 208.

CHRISTIAN FENGER.—*Ibid.*, 1901, vol. xxxiv, p. 771.

H. W. FREUND.—'Beiträge zu Geburtshilfe u. Gyn.,' 1903, Bd. vii, Heft 3.

SCHRAUM.—'Wiener med. Wochenschr.,' 1903, Nos. 8 and 9.

MAX NASSAUER.—'Münch. med. Wochenschr.,' 1898, April.

GÖSHEL.—'Deutsches Archiv f. klin. Med.,' vol. lxxiv, Nos. 1–4.

F. F. LAURENCE.—'Surg. Gyn. and Obstet.,' 1905, vol. i, p. 443.

S. LLOYD.—'New York Med. Journ.,' 1905, vol. lxxxii, p. 885.

G. FALUDI.—'Jahrbuch f. Kinderheilkunde,' vol. lxii, No. 3.

DUNCAN MACARTNEY.—'Glasgow Med. Journ.,' 1906, May.

T. GUTHRIE.—'The Practitioner,' 1906, June.

MONTI.—'Wiener klin. Wochenschr.,' 1897, No. 42.

EBSTEIN.—'Thesis, Breslau,' 1899.

NANNOTH AND BACIOCCHI.—'An. d. Università Toscano,' 1895, xx.

HENRI FONTAINE.—'Boston Med. and Surg. Journ.,' 1901, October.

J. F. BOTTOMLEY.—'Boston City Hospital Reports,' 1900, p. 118.

L. TELEKY.—'Centralb. f. die Grenzgebiete der Med. u. Chir.,' 1899, Bd. ii, Nos. 7, 8, and 9.

J. HERZFELD.—'Mittheil. aus den Grenzgebieten der Med. u. Chir.,' Bd. v, Heft 2, p. 1884.

A. FRANK.—*Ibid.*, Bd. vi, Heft 1 and 2, p. 97.

FRIEDLÄNDER.—'Archiv f. klin. Chir.,' Bd. lxx, No. 1.

WUNDERLICH.—'Archiv f. klin. Gyn.,' Bd. lix.

CHAPTER XX

TUBERCULOSIS OF THE OMENTUM: INTRA-ABDOMINAL MASSES OF TUBERCULAR MATERIAL

THE close association of the above conditions in many cases with tubercular peritonitis would have rendered their discussion under the heading of this disease quite appropriate; but there are features of both a pathological and clinical nature which seemed to warrant a separate consideration of them advisable.

The omentum may or may not be involved when there are tubercles scattered over other parts of the peritoneal surface. When it is implicated, it presents very variable aspects. In its simplest form the membrane merely presents tubercles sprinkled throughout its substance with little or no other change. Such a condition is well represented by a specimen in the Museum of the Brompton Hospital for Consumption (No. 380). A piece of omentum is stretched upon a plate of black glass, and shows the membrane to be studded with miliary tubercles.

The most striking changes observed, however, are those which show the membrane greatly thickened, and in some cases markedly contracted. Why in some cases and not in others this increase in size should take place it is impossible to say, but so marked may it be that the condition has often been mistaken for a tumour of some other kind. In the specimen from which Fig. 57 is taken, and which is in the Museum of Guy's Hospital (No. 1209), the omentum forms a large pendulous mass due to "a firm uniform deposit." On close inspection of the specimen itself numerous miliary tubercles are seen studding the surface. The specimen was removed *post-mortem* from a man aged forty-six years, whose pleura and pericardium were found infiltrated with tubercular deposit, but in whom the lungs and other viscera appeared free from infection. There are two other specimens worth noticing where the thickened omentum formed large flat and pendulent masses. One is in

the Museum of St. Thomas's Hospital (No. 1145), and resembles, as the late Professor Charles Stewart described it, a " pancake." The other, not quite so large, is in the Museum of St. Mary's Hospital (No. 923). Microscopical examination of the latter specimen showed it to be infiltrated with tubercles. A specimen is also described by Marsden and Moore (1) where the omentum formed a solid flat tumour, which covered the front of the abdomen, and had in its substance a few small hæmorrhages. In this case the peritoneum was thickened generally over the viscera and the parietes.

The other form which the thickened omentum may assume

FIG. 57.—Tuberculosis of the omentum forming an enlarged tumour-like mass. (Guy's Hospital.)

is that of a finely nodulated wrinkled mass, contracted and drawn high up in the abdomen. An example of such may be seen in the Museum of Guy's Hospital (No. 1213). It is described as " contracted and infiltrated with a firm deposit, which appears as caseating tubercle." The specimen was removed from a boy aged fifteen years who died of phthisis. There were also intestinal adhesions which, together with the peritoneum, were studded with tubercles.

The clinical interest of these tubercular omental masses centres upon their being mistaken for tumours of some other nature. The mistake, however, is less likely to be made where due regard is had for the existence of other symptoms

significant of tuberculosis either within the abdomen or in the lungs.

The tumour-like mass may be felt in any part of the abdomen. When contracted it is usually seated in the umbilical or epigastric region. The irregularity of its outline may sometimes be made out when the parietes are thin, and the accompanying abdominal distension not too marked. Where no such shrinkage of the tissue takes place the swelling exists mostly in either the right iliac fossa or the hypogastric region. The position of the mass is doubtlessly determined in some cases by the primary focus of the disease. The tubercular predilection of the ileo-cæcal region seems to have an attractive influence; and the result of the protective propensities of the omentum being brought into play at an early stage of the disease, leads finally to the membrane itself becoming infected.

Judging from the results attained in the two cases narrated below, partial or complete removal of the involved omentum would appear to be the correct practice. Whether the success is to be attributed actually to the removal of the affected tissue, or to that mysterious influence which so often follows the simple exposure of the viscera in abdominal tuberculosis, it is not possible to say.

CASE L. *Tubercular omentum ; forms a tumour in the right iliac fossa ; laparotomy ; partial excision ; cure.*

W. T—, aged five years, was admitted to the Victoria Infirmary in May, 1905. Up to eleven days before admission he appears to have enjoyed good health, except that he had been somewhat thin for a time. At this time he was seized with severe abdominal pain, which, according to the history given, shifted backwards and forwards across his belly. This was accompanied by vomiting, and a feeling of swelling, and induration in the right iliac region. During the few days which intervened between his primary seizure and his admission to the hospital, he had suffered from occasional attacks of vomiting. His bowels had been kept open by the administration of oil. His temperature also had been somewhat raised. He had been losing flesh considerably. His family history appeared to be good.

On admission the boy was seen to be red-cheeked and fairly healthy looking, but his body was markedly emaciated. His temperature was 102° F., and his pulse 104. There was no abdominal distension; but there existed tenderness in the right iliac region accompanied by increased resistance. A swelling about the size of an orange, tense,

non-fluctuant and fixed, and dull on percussion, was felt in this region. His lungs were healthy, as also were apparently the other thoracic organs.

The abdomen was opened as for an appendicectomy, when what was felt as a tumour externally proved to be a large mass of greatly thickened and œdematous omentum. It was partially removed. Lying under the thickened mass of omentum was the bowel, the parietes of which was noted as being markedly indurated. Near by was a caseous mesenteric gland the size of a pigeon's egg. The child made a good recovery from its operation, and left the infirmary about seven weeks later, generally speaking well, but not putting on weight. About eighteen months after his operation, that is to say in January, 1907, it was ascertained that he was perfectly well and going to school.

In this case, the emaciation, which had been going on for some time, together with the gastro-intestinal symptoms and attacks of abdominal discomfort, associated also with a rise of temperature, might very reasonably have allowed of tuberculosis being entertained. Still further, the induration of the bowel wall noted beneath the omental mass, and the existence of a large caseous mesenteric gland, all seemed to point to the existence of a tubercular lesion in the ileo-cæcal region which had been the primary source of infection of the omentum. If this be the true construction of the case, then it would appear that the good result which followed the operation probably depended upon influences other than those connected simply with the removal of a portion of the thickened omentum.

CASE LI. *Tubercular omentum; forms a tumour in the right iliac fossa; laparotomy; partial excision; cure.*

T. D—, aged eighteen years, was admitted into the Victoria Infirmary in April, 1906. The history given was that, three years ago, he was operated upon for hernia on the right side, and since that time he appears to have had no discomfort until about five weeks before admission. At this time he began to be troubled with a gnawing pain which continued, off and on, until four days before entering hospital, when it became at times so severe as to "double him up." He did not vomit, and his bowels continued regular. On entering the hospital, he was not noted as being particularly ill; but on examination of the abdomen a marked area of tenderness and resistance existed in the right iliac region. A distinct mass was also noticed in this area, and extending well towards the middle line. It was also

noticed that there was some superficial tenderness of the skin over the
old hernia scar, and examination *per rectum* caused pain when pressure
was made on the anterior wall.   His tongue was thickly coated with
white fur and his breath offensive.   The temperature was 102° F. and
the pulse 88.   In the course of twenty-four hours his temperature fell
to normal, and his pulse also lessened to about 60.   During the two
days he was under observation his pain and other symptoms seemed
to quiet down; but an exacerbation took place on the third day, and
operation was then decided upon.

   The abdomen was opened as for an appendicectomy, but the incision
had to be enlarged downwards and inwards to the middle line just
above the pubes, in order to expose a large tumour-like mass of
omental tissue which extended into the pelvis.   The mass seemed to
be adherent to the parietes in the region of the internal inguinal ring.
It was in part excised, and in detaching it a small pocket of pus was
opened into.   The spermatic cord, at its entrance into the internal
ring, appeared to be intimately mixed up with the inflammatory tissues.
The vermiform appendix, when sought for, was found non-adherent
and apparently healthy.   The pathological report of the tumour
removed was that it was tubercular; microscopical sections showed a
large amount of inflammatory tissue with some ill-formed giant-cells.

   The boy left the infirmary about six weeks after his operation quite
well.

   In this case the early symptoms were far from being so
suggestive as in the preceding case.   And the source of infec-
tion of the omentum equally lacked the same apparent clear-
ness.   It is not without interest to note, however, the close
connection which existed between the omentum and the internal
inguinal ring : the small pocket of pus opened in this neighbour-
hood; and the intimate involvement of the structures of the
spermatic cord.   The question naturally arises whether there
could have been any connection between the operation for
hernia and the subsequent development of a tubercular infec-
tion; whether, in fact, a buried ligature had been a source of
irritation, and so, indirectly, a predisposing cause for tubercular
infection.

   The presence of tubercular masses within the peritoneal
cavity is by no means an uncommon occurrence, and, perhaps,
as frequently encountered by the surgeon as by the patho-
logist.   It raises primarily the interesting question of their
probable source, more particularly in those cases where there

exists no other lesion in association. In by far the majority of cases, and it may quite possibly be in all, they are the lingering effects of antecedent tubercular disease of an active, local, or general character. Failing to disappear or become absorbed in the natural process of repair which has taken place in other parts, they remain as, more or less, permanent representatives of a once active and extended lesion.

In many cases, especially when comparatively small, they are the result of accreted masses of caseous tubercles which have become calcareous. When of larger size they may be the result of dried up localised collections of tubercular material which have accumulated and been hemmed up between coils of intestine. The masses, whatever size they may be, are usually more or less fixed, although, in some cases, they seem as if pedunculated—that is, connected by a fibrous band or adhesion to some part.

As suggesting their probable origin, there is often a previous history of some chronic intestinal disorder, or a marked indication of an early tubercular peritonitis. Thus, in the specimen which exists in the Museum of St. Bartholomew's Hospital (No. 1883A), removed *post-mortem*, death had been the result of intestinal obstruction caused by old adhesions between the coils of the ileum. A mass of caseous material was found in the peritoneal cavity "resulting from a previous localised peritonitis of tubercular origin."

Illustrations of these masses have been reported from time to time. They are probably much more frequently present than is usually supposed, owing to the scarcity of the symptoms to which they may give rise. Walsham (2) describes a case where a small flattened mass about the size of a cobnut existed attached to the end of the cæcum by a mesentery. On section it was found to be partly caseous and partly fibrous ; under the microscope a few giant-cells were seen. There were a few small tubercular ulcers in the ileum. The mesenteric glands were not enlarged nor caseous; but miliary tubercles were scattered throughout the mesentery. The specimen was taken from a man, aged forty-four years, who died of chronic phthisis. Churton (3) refers to three cases that he met with clinically. The first case was that of a boy, aged ten years, who, in addition to ascites, " had two thick masses" within his abdomen. The second was a woman, aged thirty-seven years, who simi-

larly had ascites with a mass "the size of two closed hands in the mid-abdomen"; and the third, a man who had had a somewhat similar mass in his abdomen for nearly a year. It is possible, of course, in these cases that the masses may not strictly have been of the nature of those specially referred to here, for mesenteric glands or localised collections of fluid and adhesions of intestines might equally explain what was felt.

There is little doubt that the presence of such masses within the abdominal cavity is a constant source of menace to the patient. It has been amply shown that the oldest tubercular focus may contain within it bacilli that need but to be liberated to re-light up the disease, which has, in a sense, only lain dormant. There should, therefore, be no hesitation in removing such bodies or masses by laparotomy.

AUTHORS REFERRED TO.

1. MARSDEN and CRAVEN MOORE.—' Brit. Med. Journ.,' 1901, vol. i, p. 1271.
2. HUGH WALSHAM.—' Trans. of the Path. Soc. Lond.,' vol. xlvii, p. 48.
3. THOMAS CHURTON.—' Lancet,' 1895, vol. i, p. 594.

CHAPTER XXI

THE GENERAL AND PROPHYLACTIC TREATMENT OF TUBERULOSIS

BY

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SURGICAL tuberculosis is, in the majority of cases, a local disease. True there may occasionally be a miliary infection where all or most of the tissues of the body are invaded; but the proportion of such cases is so small, and their cure is so hopeless, that the question of the treatment of tuberculosis really resolves itself into the treatment of its local manifestations. This, however, does not imply that the treatment must be entirely local or even in any way local. The surgeon frankly recognises this, and he tells you that the treatment of his patient most often only begins with the excision of the local lesion. Hence the general or constitutional treatment of tuberculosis is of the first importance from the point of view of the surgeon as well as from that of the physician.

The tuberculous lesion, depending as it does for its origin and development on a specific micro-organism, the tubercle bacillus, the rational treatment of tuberculosis must have for its aim the destruction of this bacterium. And it is with this object that the various methods of treatment at present in vogue have been elaborated; these we now proceed to consider. They may be grouped for convenience into four different divisions, viz.—

1. Treatment by antiseptics and other chemical substances.
2. Serum treatment.
3. Vaccine treatment.
4. General tonic treatment.

1. *Treatment by antiseptics and other chemical substances.*—
This method of treatment has had a most extensive trial in
the various forms of tuberculosis, but the results have not
been altogether satisfactory.   Such substances as iodine, iodo-
form, carbolic acid, creasote, menthol, formol have each been
given for long periods at a time and in various ways, some-
times by the mouth, sometimes subcutaneously, and sometimes
intravenously.   They are given with the view of destroying
the tubercle bacillus or of lessening its virulence ; but it is
found that while some of them will readily kill the bacilli *in vitro*,
when introduced into the human organism in sufficient concen-
tration they as readily kill the tissue-cells.   Formol has, per-
haps, given the best results, but these are not such as to make
one use the drug with much confidence.   More recently Dr.
Albert Gray has found aniline oil very useful when applied
locally in certain cases of lupus ; but this is manifestly a
substance that cannot be used safely for less superficial
lesions.

We may take it, then, that we have at present no specific
germicide for the tubercle bacillus, no drug with the action,
for example, of quinine on the plasmodium malariæ.

2. *Serum treatment.*—The great success that has attended
the serum treatment of diphtheria naturally suggested the
introduction of a similar treatment for tuberculosis; and for
the past fifteen years or more many attempts have been made
to produce an antituberculous serum.   These sera have been
used with more or less success in the prevention and cure of
tuberculosis in animals, and some of them have been used for
treatment in man.

The general idea which underlies the production of the
serum is that of vaccinating some animal with attenuated
cultures of the tubercle bacillus, or the toxins derived from
the bacilli, or with various combinations of the cultures and
their toxins.   It was hoped by this means to produce an
active immunity in the animals so treated, and then to use the
animals' serum with the purpose of producing a passive immu-
nity in other animals or in man.

Some eighteen or more different sera have in this way been produced, and of these some were claimed to be both antitoxic and bactericidal while others were shown to be merely antitoxic, *i. e.* they lessened certain symptoms, but had little effect in retarding the growth of the tubercle bacillus. The two sera that have been most used for the treatment of the human subject are those of Maragliano and of Marmorek, and these we must now consider.

Maragliano (1) firmly believes in the virtue of his serum. He says, " All my researches on the question, both clinical and experimental, for more than fifteen years, lead me to state— (1) that it is possible to produce a specific therapy for tuberculosis; (2) that it is possible to immunise the animal organism against tuberculosis as is done in other infectious diseases, and that there is a good reason to hope for an antituberculous vaccination for man." He holds that the pathogenic action of the tubercle bacillus is in part due to toxins secreted by the bacilli when they are biologically active, and in part due to toxins contained in the bodies of the bacilli themselves. The former are soluble and are obtained in the filtrate of young cultures ; and they seem to have a special affinity for the nervous system, especially its secretory mechanism. The latter are closely bound up with the cell protoplasm of the bacillus, and are inflammatory and necrotic in their action. There are in health, he says, in human blood antitoxic materials for both these toxins, and these antitoxins can be increased by injection subcutaneously of appropriate tuberculous material.

Maragliano uses cows for the production of his serum, and he injects them with two different preparations—(1) " Liquid F," consisting of equal parts of watery tuberculin and the filtrate from bouillon cultures of tubercle fully grown, *i. e.* six to eight weeks' growth; (2) " Bouillon pulp," which is made from the tubercle bacilli left from the filtering of the bouillon cultures. These bacilli are ground in a mortar with dry sand, then cold water is added, and the whole is put on a Pasteur-Chamberland filter; the filtrate is supposed to contain all the filtrable substances formed in the bacilli. Maragliano contends that these two substances, " liquid F " and " bouillon pulp," contain the sum total of all the poisons elaborated by the tubercle bacillus, and they are therefore

used for the purpose of producing an antituberculous serum. They are injected subcutaneously into the cow in increasing doses at certain intervals of time ; and the animal's serum is used for purposes of treatment when it is found to contain as much as 1000 antitoxic units per cubic centimetre of serum. The serum so obtained is held to be not only antitoxic but also agglutinative and antibacterial; and besides this when injected into another animal it is said not only to produce in that animal a passive immunity, but to stimulate the tissues of the animal to produce antituberculous material on its own behalf.

In Italy several thousands of cases, mostly of pulmonary tuberculosis, have been treated with this serum, and records have been kept of some 2900 of them.   Only 250 could be regarded as being in the early stage of the disease, i. e. with circumscribed pulmonary lesion and no fever ; but of these 38 per cent. were claimed as cured, and 49 per cent. as greatly improved.   The results with the more advanced cases were not so good ; but, generally, with the injection of the serum it is said that the symptoms lessened, that nutrition improved, and that the areas of tuberculous infiltration became sclerosed. Such results, it is pointed out, cannot be counted on unless the cases are pure infections ; cases of mixed infection may improve, but cure must not be looked for.   Further, it was demonstrated that the blood serum of patients who had been treated with Maragliano's serum showed considerable increase in its antitoxic, antibacterial, and agglutinative power.   The serum, too, when given to animals by the mouth gives a relative immunity to tuberculosis ; and other animals fed on the milk of cows so immunised acquire thereby an increased resistance to the disease (2).

But in spite of Maragliano's results his serum so far has not come into general use.   During the years 1904 and 1905 it was tried on some forty cases at the Henry Phipps Institute, Philadelphia (3).   The serum used in some of the cases was that supplied by Maragliano, and in the others it was made in America according to Maragliano's instructions.   Some of the patients received the serum by the mouth and others hypodermically. The dose ranged from 1 to 3 c.c. given twice a week, and in some of the cases the treatment extended for eight months ; but when given for so long it was usually intermitted from

time to time. The results obtained, however, were not particularly favourable to the serum. Only twelve of the cases were in the early stage of the disease, and the other cases may have had mixed infections. But even with these twelve cases any improvement in them seemed little more than can be obtained by the methods of treatment ordinarily in use in a sanatorium for tuberculosis. There were, however, apparently no ill-effects from the use of the serum.

In such a chronic disease as tuberculosis, it is, of course, exceedingly difficult to form an accurate estimate of any method of treatment, particularly in regard to its permanency; and so we are not yet in a position to form a positive opinion as to the ultimate value of this serum. It seems clear, however, that it can protect animals against the poisons of the tubercle bacillus as well as against the bacillus itself, at least, in doses which would quickly kill animals not so protected. But to protect a laboratory animal is not the same as protecting the human subject; neither is it the same as curing the animal when infected; and the curative use of the serum does not so far seem certainly determined.

Marmorek's serum is produced somewhat differently from that of Maragliano. Marmorek holds that tuberculin is not the specific toxin of the actively growing tubercle bacillus, hence there is nothing to be gained by injecting it into animals, for the result would only be to produce an antituberculin serum. He suggests that tuberculin is produced by the older bacilli, that its action is on the younger bacilli, stimulating them to produce their specific toxin, and that it is to this latter toxin that the phenomena of tuberculosis are due. He, therefore, grows his cultures on a medium as like as possible to that of the human body so as to keep the bacilli as long as possible " primitive." In this way he claims that he can produce the specific toxin to the almost complete exclusion of tuberculin, *i. e.* the toxins produced resemble those in human tuberculosis. The toxin is then injected into horses in the usual way, it taking eight months to immunise each animal. The horse's serum protects rabbits against tubercle bacilli injected intravenously, and it has been used for treatment of tuberculosis in man. The results recorded, however, are so far by no means uniformly favourable, though some of the reports speak well of the serum.

It will thus be seen that the success of the serum treatment of tuberculosis is not yet sufficiently assured to permit of its being recommended with any certainty of a beneficial result. Indeed, theoretical considerations make one question the possibility of producing a serum for the cure of tuberculosis such as we have for diphtheria, for the methods by which the micro-organisms of these two diseases produce their effects are very different.   In diphtheria the symptoms are due to a diffusible toxin produced by a micro-organism which is always local in its growth.   This toxin can be separated from bacilli by filtration, and is, therefore, readily available for injection into animals so as to produce the antitoxin.   But in tuberculosis the important toxin seems to be endogenous, and is probably only liberated when the bacillus dies, or possibly when it comes in intimate contact with some tissue cell which it wishes to destroy.   The toxin is chiefly local in its action, it is difficult to isolate, and hence the difficulty of obtaining its antidote. But, even if such an antidote were procured, it is not certain that it would inhibit the growth of the bacillus.   Hence the problem in tuberculosis seems to resolve itself into the finding of an antibacterial rather than an antitoxic substance. Maragliano, it is true, claimed that his serum was both antibacterial as well as antitoxic.   Probably this is so; but the question arises, is it sufficiently antibacterial to be efficient ? One would be disposed to answer this in the negative.   For it is well recognised that the production of an antibacterial serum to be used for producing a passive immunity is a matter of great difficulty.   In practice there is found to be a limit to this sort of immunisation.   This probably depends on the fact that most often two substances are concerned in the killing of a bacterium, namely, the "immune body" and the "complement."   But only the former is present in the immune serum, and it requires "complement" also to be present before the bactericidal action is obtained.   Hence it is useless adding any considerable quantity of "immune body " if " complement " is not also added.   As, however, the problem of the artificial supply of "complement" has not yet been solved, we cannot but think of these antibacterial sera as likely to be somewhat restricted in their curative action.

3. *Vaccine treatment*.—Sir Almroth Wright (4) defines a vaccine as " any chemical substance which, when introduced

into the organism causes there an elaboration of protective substances." Vaccine treatment, therefore, aims at the production of an active immunity rather than the passive immunity of the serum treatment. The vaccine is derived from the bacteria themselves, and when it enters the animal organism it is said to combine with the natural antibacterial substances already existing in the blood, so that these anti-substances are lost to the organism for the time being. But this loss is only temporary, for it seems to stimulate the tissue cells to a greater activity so that the substances lost are more than made up again.

Now these antibacterial substances have a definite action on bacteria entering the tissues, and while our knowledge of this subject is limited we know that there are at least four different antibactericidal bodies each with a different action on the bacterium. These actions are (1) bactericidal, (2) bacteriolytic, (3) opsonic, and (4) agglutinative. Certain bacteria, e. g. Bacillus typhosus, are acted on by all these substances, but others, such as Bacillus pestis and Staphylococcus pyogenes, are "insensible" to bactericidal, though eminently "sensible" to opsonic action. With certain bacteria, therefore, all these four anti-substances may have a share in their destruction, whereas with others it is only one or, perhaps, two of the antibodies that have any such action.

As to the tubercle bacillus, it seems to be acted on mainly by opsonins, and possibly also by agglutinins. Hence the opsonins in blood and other fluids would seem to be the substances on which we chiefly depend for preventing the bacillus invading and growing in our tissues ; and the opsonic index, i. e. the measure of the capacity of the blood-serum to aid white corpuscles to take up tubercle bacilli would seem, therefore, to form some measure of the resistance of our tissues to this micro-organism. The agglutinins probably also count for something in this connection, and it is found that the agglutinative power of the blood most often runs parallel with its opsonic power, though agglutinins are probably different substances from opsonins. But the opsonins are regarded at present as the antibacterial substances which have most to do with the destroying of the tubercle bacillus, and the vaccine treatment, as elaborated by Sir Almroth Wright and his pupils, aims at increasing this opsonic power of the blood so that it may the

more readily deal with the invading bacterium. It has likewise been shown that the tubercle bacillus grows best in people whose opsonic index is low, and hence most patients with a chronic tuberculosis have a low index. The bacillus also grows best in tissues most removed from the blood-stream, *i. e.* where their lymph will contain least opsonic material, for it has been shown that the body fluids generally contain less opsonins than the blood itself. The problem, therefore, in treating a tuberculous lesion is to increase the opsonic content of the blood, and then to bring this blood, rich in opsonic material, in as intimate contact as possible with the lesion.

The vaccine to be used for the purpose of increasing the opsonic power of the blood must, of course, be antibacterial. Hence Koch's "old tuberculin" * is of little use, as it only contains the soluble products of the bacilli, and would give no immunity to the more important endogenous toxins. Koch's "new tuberculin" or "tuberculin R." meets this want, being made from the disintegrated bacilli themselves. It contains, therefore, all the constituents of the bacilli with the exception of the soluble toxins which have been removed by filtration. It is "tuberculin R.," then, that is used as the antibacterial vaccine for tuberculosis, and as prepared for the market it consists of 10 mg. of the dried tubercle bacillus powder in 1 c.c. of a 40 per cent. solution of glycerine in water. Various strengths of this are used according to the dose to be given, the diluting fluid being a 0·85 per cent. solution of sodium chloride. The doses given range from $\frac{1}{800}$ to $\frac{1}{3000}$ mg. Dosage is of the greatest importance, for the opsonic index varies accordingly. For example, just after the tuberculin is given the index is found to fall—the negative phase. If the dose is small this phase is of short duration, and is followed by a positive phase, when the index goes considerably higher than before injection of the tuberculin. This positive phase lasts for ten days, and then the index falls to near what it was before treatment was commenced. The injection must, therefore, be repeated about every ten days if the index is to be kept up to a good standard. If too large a dose of tuberculin be given the negative phase is considerably prolonged; or if a too rapid succession of injections be given we may have one negative

* The "old tuberculin" is the filtrate from a two months' growth of tubercle bacilli, and only contains the soluble products of the bacilli.

phase superimposed on the preceding negative phase with a bad result as regards the opsonic content of the blood. This is probably what takes place in the presence of an active tuber‑ cular lesion. Such a lesion is doubtless constantly producing tuberculin, and as this tuberculin enters the circulation so will the opsonic index be affected. If in small doses and at proper intervals, the index may increase, but if in larger doses and too frequently, there results a series of negative phases and the index greatly lessens. Sir Almroth Wright (5) has shown that by massaging a tuberculous lesion or moving a tuberculous joint the index may be considerably altered, due, doubtless, to the movement sending an increased amount of tuberculin into the circulation. By this auto-inoculation the patient unconsciously treats himself, but it is a haphazard method of treatment, and the chances of the dosage being right are much less than of its being wrong. In treating a patient, therefore, by means of vaccination, it is clear that the less tuberculin passing from the tuberculous lesion into the circulation the better, for then an accurate dose may be given hypodermically ; and, therefore, the chronic cases where the lesion is more completely shut off from the circulation will be the ones most suitable for vaccine treatment. Sir Almroth Wright has suggested that this shut- ting off from the blood-stream would be rendered more complete if the coagulability of the blood were increased by such a drug as calcium chloride, for then the blood-serum would not so easily penetrate to the tuberculous focus, and would, therefore, have less chance of receiving tuberculin therefrom. Later on, when the opsonic index of the blood is raised to a higher standard by suitable injections of tuberculin, other substances might be given so as to increase the permeability of the blood- serum, and so as to bring this serum with its opsonins more readily in contact with the bacilli in the infected focus. This increased transudation of blood-serum may also be aided by certain " drawing " substances, such as soap and sugar, or local stimulants, as poultices and Finsen light.

This vaccine treatment has now been used in a very con- siderable number of cases of all kinds of tuberculosis, and it may be said that on the whole the results have been favour- able. It has, however, apparently very definite limitations, in that the degree of immunity that can be produced is limited, and also in that the duration of immunity is somewhat brief.

Its use, too, would seem to be restricted to the more chronic and localised forms of tuberculosis, where little auto-inoculation is taking place.   Still the line of treatment is so rational and apparently safe, when guided by frequent estimations of the opsonic index, that one cannot but look upon it with favour. But it demands much time, and the estimation of the opsonic index requires a special education, so that in the meantime this treatment is almost entirely in the hands of the laboratory worker.

4. *General tonic treatment.*—This method of treatment has for its basis the popular idea than an individual in sound health is less liable to disease than one whose condition is below par.   That the idea is correct would seem to be confirmed by experiments on animals, as well as by a vast amount of clinical experience.   The immunity of an animal to certain infections, it has been found, varies according to the general health of the animal.   If the health is good the animal remains relatively immune, but if debilitated by fatigue, starvation, or other causes, the immunity disappears, and the animal no longer offers an adequate resistance to the invading micro-organisms.   And the same holds true in the human subject, particularly in regard to the tubercle bacillus.   A period of debility is frequently a forerunner of tuberculosis, hence the frequency with which this disease so often follows measles and whooping cough in children, and complicates diabetes and other wasting illnesses of the adult.

The aim of this tonic treatment, therefore, is to improve the general health and nutrition of the individual, so that his tissues may the more readily resist the growth of the tubercle bacillus.   The treatment is, perhaps, best exemplified by the " open air and feeding method " in force in the various sanatoria for consumptives ; for sanatorium treatment aims at making its patients live an ideally healthy life, and in so doing it is really increasing the immunity of the tissues just as vaccine treatment does.

The chief essentials for this ideally healthy life are—
(*a*) fresh air, (*b*) an ample diet, (*c*) rest with regulated exercise when possible, and (*d*) freedom from excitement and worry.

(*a*) The advantages of fresh air to the organism are so well recognised that they scarce need to be insisted upon.   Tuberculosis is unknown in animals living free in the state of nature;

while, on the other hand, it is exceedingly prevalent in some of the domestic animals, especially those shut up in ill-ventilated houses. One's feeling of fatigue after an hour spent in a crowded room, breathing the vitiated air, well illustrates the disadvantages of bad ventilation.

In the treatment of tuberculosis, then, we wish for our patients a perfectly pure air, free from dust and other irritative particles. The purest air is to be obtained out of doors, therefore the patient should live as much in the open air as possible. Such patients, to begin with at least, must rest for the greater part of the day, and this resting should be done in the open. The patient readily gets accustomed to the air, and he is rarely found chilling or taking cold. He, of course, must be well fed and adequately clothed, and his feet kept warm with a hot water bottle if necessary. If the wind is blowing there should be shelter of some sort, for the wind takes away heat from the body by passing so rapidly over it, and so may cause a chill. Also it stirs up dust and other material which may irritate the respiratory tract; and, in any case, the tuberculous patients do better in a still atmosphere than when the wind is blowing. Considerable degrees of cold should not prevent the patient being in the open air. It is found that he most often does better in cold weather than in the heat of summer, and, indeed, the disease sometimes runs a rather rapid course in the warmer climates. Sunshine is beneficial if the heat of the sun is not so great as to be oppressive. The open air mode of life helps the appetite and so aids nutrition; it increases oxidation, and so the metabolic processes of the body go on more actively. It is likewise an excellent antipyretic; and it is the exception rather than the rule for fever to persist after the patient has been lying in the open air for ten days or so. Fresh air is hypnotic in that the tuberculous patient sleeps much better than formerly.

In fine weather the patient may spend the whole night in the open air or in an outside shelter; but in our climate it is, perhaps, more convenient to sleep indoors. The choice of a bedroom and its ventilation is, therefore, a matter of some importance. The room should be of moderate size; 2000 cubic feet capacity does sufficiently well, but the windows must be large, and they should be of the French pattern, so that they may stand wide open. The room should face the south, unless

in very warm weather, for the sun is a good disinfectant, and it is agreeable to the patient to have the sunshine in his room. The furnishings should be few and simple, so as to occupy little space and gather as little dust as possible. The room must be kept clean, and dusting should be done with a damp cloth, so as not to send the dust and its micro-organisms floating into the air, only to settle down again when the process is at an end. Disinfectants may with advantage be used from time to time to wash the floor and even the walls, for tubercle bacilli lying about might be inhaled and re-infect the patient; or other micro-organisms might be present, and, if introduced into the tissues, complicate what was otherwise a simple infection.

For the greater part of the year there is no need for artificial heat in the bedroom, and in some sanatoria there is no heating of the bedrooms the whole year round. But in our climate some form of artificial heat, during the winter months, seems almost a necessity. The heating is very conveniently effected by electric radiators, for then the heat can be well regulated, and there is the freedom from dust that an open fireplace produces. The temperature should not be above 50°—55° F. The rooms should be lit by electricity. When dressing or undressing, the patient has his windows shut, but at all other times they should be wide open. The meals must also be taken in a well-ventilated room, which must not be over-heated.

The arrangements of the house in which the patient is lodged are thus seen to be of importance, and they perhaps count for as much as, or even more than, the sort of climate in which he should live. Generally, it is held that the patient's native country, where the rest of his life is to be spent, is the best climate in which to undergo the open-air treatment; and the results obtained in the sanatoria in Britain seem to be quite as good as those elsewhere. Of course all districts are not equally good. One chooses naturally a locality where the rainfall is reasonably small, where there is a maximum amount of sunshine, and where there is a sandy subsoil to promote surface drainage. The house or sanatorium should stand high, not less than 700 feet, and it should be well sheltered by hills or belts of trees from the prevailing wind. But the choice of climate and locality must depend to a certain extent on the

individual patient.   Some seem to do best at high altitudes;
others lower down; and some do well at the sea coast; while
others are much better in the country.   The patient's prefer-
ence, too, should at least count for something.

(b) Feeding is the second important factor in this treatment
of tuberculosis.   The food must be ample, and given in such
variety and at such intervals as will best aid digestion and
assimilation.   The tuberculous patient requires more food than
the healthy individual, for his weight is probably much below
what it should be.   In the open air, too, more food is required,
for more heat is given off and the tissues are better oxidised.
Hence the diet must be very generous; and the patient's
appetite should not be taken as an index of the amount of food
to be eaten, for his need is often much greater than his appe-
tite.   The over-feeding should be continued till the weight is
well above the normal; but it must have its limits, for too
much food just tends to fatten, and is a real disadvantage in
the way of causing breathlessness and disinclination for exer-
tion of any kind.

The food given to the tuberculous patient must be of the
best quality, easily digestible, and chosen so as to contain
the maximum amount of nourishment.   Proteids and fats are
the most important elements, but green vegetables and other
carbohydrates are also necessary.   Three meals a day, with an
interval of from four to five hours between each, seems to give
the best results.   Proteid foods should be given at each meal,
and should be represented by at least one pound of animal
food in the twenty-four hours.   The fat should have no limit,
and should be given in every form the patient can swallow it.
Sauces made with butter can most often be given at every
meal, and the bread eaten should be thickly spread with butter.
Milk, being an easily digested and very nourishing food, should
occupy an important place in the dietary.   It can often be
taken along with, and in addition to, the ordinary meal when
more solid food would be refused.   Hence milk is most useful
for increasing nutrition and putting on weight; three pints and
more may be given in twenty-four hours, in addition to the
more solid forms of food.

Fever should not be a contraindication to such a diet as this,
for it has been found, in tuberculous patients at least, that the
more solid feeding has often an antipyretic action, lessening

the fever rather than augmenting it; and also that patients in the open air can digest food they would not do otherwise.

If there should be much indigestion the meals must be simplified, and given in smaller quantities and at shorter intervals. In the more extreme cases milk, plasmon, koumiss, eggs, and raw meat juice will have to form the chief elements of food. The average patient is probably better without any alcoholic beverages along with his meals, and, unless when specially indicated, stimulants should not be given.

(c) *Rest and exercise.*—The value of rest in illness, especially where there is any inflammatory process going on, has long been recognised. Not only does it conserve energy and avoid fatigue, but the temperature is steadier and the food is better digested. In the open-air method of treatment adequate rest has been claimed to be not only beneficial, but essential. The observation, to begin with, was largely empirical; but recently Sir Almroth Wright (6) has given an explanation of the disturbances and disadvantages which accompany undue movement in tuberculosis. He has shown that movement (or massage) at the seat of lesion may send an undue amount of tubercle toxin into the circulation, and that, as a result, not only may the opsonic index be lessened, but definite toxic symptoms may supervene. Rest, therefore, during vaccine treatment is of importance; and, probably for the same reason, rest is equally important in the earlier stages of the general treatment of tuberculosis.

But, at the same time, it has been found that carefully regulated exercise must also have its place in the open-air method of treatment, and the experience of many years has now convinced the sanatorium physician of the advantage of exercises in the treatment of tuberculosis. It is pointed out that, to have healthy tissues, an adequate amount of exercise is essential; that exercise strengthens the heart, improves the circulation, aids digestion and elimination; and, indeed, that all the functions of the body are improved thereby. It is conceivable, too, that, if the exercise be given in proper amount, and at a suitable stage of the disease, the auto-inoculation that results may be entirely beneficial rather than harmful. The exercise must, therefore, be suitable to the patient's strength, and should alternate with adequate periods of rest.; in particular, there must be at least an hour's rest before each meal.

But it has always been a difficulty to determine when the patient may begin to exercise, and what amount of exercise he may take with impunity. It may be in the future * that the state of the opsonic index taken after exercise will be the guide on this point; that is, if the index be low, and remains low for any length of time, it must mean a lessened resistance to the tubercle bacillus, and exercise under these circumstances cannot but be regarded as doing harm. If, on the other hand, the index be higher after exercise, then exercise is doing good. In the meantime, however, there are a few general rules that may guide us. To begin with, the patient is kept at rest for the first fortnight till he gets acclimatised to the open air, to the extra food, and to the change in his general mode of life. Then, as long as the evening temperature reaches over 99° F., rest is still enjoined. If exercise raises the temperature to 99° F. this may be taken to indicate that there has been too much exercise, and that it has been actually harmful. When the full diet cannot be taken the patient is usually better kept at rest. Otherwise than this the general effect of exercise on the patient must be the guide. Is he over-fatigued? Is his pulse unduly quickened? Is there evidence of exacerbation of the disease? Is there loss of appetite? If so, there must be no more exercise in the meantime.

The form of exercise must be gentle, and, in particular, there must be no sudden effort or strain. Walking perhaps best fulfils these conditions, and, at least to begin with, suits the patient sufficiently well; but the pace must be slow, not more than two miles an hour, and there must be no hurrying. The distance at first will be short, but, as convalescence becomes established, the patient may ultimately walk up to five miles twice daily with apparently no harm whatever. Within the past two years the tendency in some of the sanatoria has been to increase rather than to lessen the amount of exercise, and also to introduce some sort of work rather than walking. Digging and other forms of gardening have been tried with benefit. They interest the patient more and take up his attention better than the daily walk along the same measured mile, which is apt to become somewhat irksome. But the work done must

* Since the above was written two papers have appeared in the 'Lancet' (7) showing that exercise does have a beneficial effect in the way of raising the index.

be carefully supervised and graduated, and until the patient is considered " cured," nothing which requires sudden or undue exertion should be indulged in.

(d) *Freedom from excitement and worry.*—This part of the " cure " is, perhaps, the most difficult to have satisfactorily carried out, especially when dealing with patients of a nervous temperament, or those who can ill afford, and who grudge the time and expense which such a lengthy treatment demands. But rest of mind is just as important as rest of body, hence mental fatigue, worry, or excitement must be avoided. The patient's amusements should therefore be of the simpler kind. His games must not excite, and his reading and conversation should run in the lighter vein. There must be no introspection. The ideal patient lets himself vegetate, and he soon adapts himself to a daily routine, which, if it is monotonous, is also eminently sedative. The day's programme should be something of this sort :—He should rise at 7.30 a.m., have a shower-bath, the skin being well rubbed in the process of drying. Breakfast may be taken at 8 a.m., and the morning should be spent resting in the open or in walking. There must always be a rest from 12 till 1 o'clock, and then lunch; the afternoon is a repetition of the morning, and dinner is at 7 p.m. The patient should be in bed by 9.30 or 10 p.m. The day should be so arranged that he be in the open air for at least eight hours in winter and twelve hours in summer.

The duration of this sanatorium treatment must depend on the individual patient, and on the degree and extent of the tuberculous process. But taking a considerable number of cases we may say that the length of time required to arrest the disease ranges from about six months to two years. Even then the patient can only be assured that his lesion is quiescent, and he must be told to regard himself as liable or predisposed to the return of the disease. The healthy life out of doors should therefore be continued for a long time after leaving the sanatorium. It is sometimes difficult to say when the lesion has become quiescent, but if the patient is able to take a considerable amount of exercise without fatigue and without rise of pulse-rate or temperature, and the opsonic index remains unaltered, there seems reason to say that the tubercular focus is no longer sending toxic substances into the circulation, and that therefore it is no longer active. This, however, does not

mean that a cure has been effected, for before declaring the patient "cured" we must be sure that the lesion is enclosed in firm cicatricial tissue, and I do not think we have any certain means of determining that. One attack of tuberculosis gives, as far as we know, little, if any, lasting immunity against the return of the disease, and, indeed, it would sometimes seem as if the first rather predisposed to a second attack. So that the patient, even if "cured" of tuberculosis, should have regard to all the prophylactic measures which are enjoined to prevent its return. This means living a healthy life in the open air; and that is the safest advice that can be given to anyone who has suffered from any form of tuberculosis.

The results of the open-air method of treatment are difficult to estimate with any degree of accuracy from the statistics at one's disposal. It seems clear, however, that most cases, even those where the disease is fairly extensive, improve very considerably with the rest, fresh air, and better food of the sanatorium. But actual arrest of the disease can only be looked for, at least with any degree of confidence, in the cases still in the early stages; and while in some of these recovery seems permanent, in many others, particularly those that return to their former mode of life, the benefit is often only temporary. The open-air treatment, therefore, has its limits, and it cannot be regarded as a specific for tuberculosis; but it has also its merits, and these we have endeavoured to insist upon.

TREATMENT OF SPECIAL SYMPTOMS.

Indigestion.—Of special symptoms requiring treatment, a disordered digestion is perhaps the most important, for if the stomach will not retain or digest the food given the patient cannot have the amount of nourishment necessary, and the whole method of treatment is apt to fail. A sound digestive system is, therefore, of the greatest importance in the successful treatment of tuberculosis, and so any disturbances of digestion must have careful attention paid to them. Reference has already been made to the advantage of an adequate rest before meals, joined to a life in the open air, as a means of lessening nausea, aiding appetite and digestion. It has also been pointed out that there should be a proper interval between each meal;

and the food, too, must be slowly and thoroughly well masticated; this, in turn, means that the teeth must be in a thoroughly sound condition. But there are patients who, in spite of the open air régime, at times show definite signs of indigestion, such as pain, gaseous distension, acid eructations or vomiting. In dealing with such it is important to find out the exact nature of the indigestion before determining the treatment. If it be a hyperchlorhydria bicarbonate of soda in water, given some time after the meal, often relieves symptoms by neutralising and diluting the excess of hydrochloric acid; and the indigestion of starches, with which this form of dyspepsia is so often associated, can sometimes be relieved by the administration of extract of malt along with the food. If the dyspepsia is of the atonic form, digestion may be aided by pepsin and hydrochloric acid, or pancreatin and an alkali, given after food; and, perhaps, strychnine should be added to help the muscle movements. If such remedies fail it will probably be best to treat the indigestion by washing out the stomach, at least once a day, and giving at shorter intervals, say every three hours, a simpler form of diet consisting of such substances as milk, raw beef juice, egg-albumen, eggs and plasmon. As the digestive powers improve, the food may be gradually increased till the ordinary sanatorium diet is again being taken. Should the appetite at any time seem to require stimulation a bitter tonic containing a dilute acid, nux vomica and infusion of gentian or columba, given half an hour before food, often is most useful.

If the indigestion be in the intestine rather than in the stomach small doses of calomel or grey powder and rhubarb, are sometimes beneficial; and in some cases creosote or petroleum emulsion seem to do good, probably on account of their local action.

Diarrhœa.—This is a symptom which so quickly debilitates the patient that it should receive immediate attention. If the diarrhœa be the result of either gastric or intestinal indigestion, the treatment of these conditions would naturally be indicated. But more often it is due to a catarrhal condition of the intestinal mucous membrane and sometimes to a tuberculous ulceration. Under these circumstances some form of opium seems to act most surely, *e. g.* Dover's powder (gr. x) with carbonate of bismuth (gr. xxx). The opium lessens move-

ment of the bowel and checks secretion, and the bismuth acts as a local sedative. Frequently it is necessary to limit the food entirely to boiled milk and such like substances. If it is the colon which is chiefly responsible for the diarrhœa an enema of starch and opium may be given.

Fever.—It has already been pointed out that in absolute rest and fresh air we have the best means of dealing with fever. The beneficial action of cold fresh air as an antipyretic is now well recognised, at least by the sanatorium physicians; and I would like to insist on the advantage of having the patients lying in the open air in preference to keeping them in their rooms; and if the weather is favourable of having them spend the night as well as the day lying outside. Cold or tepid sponging of the skin is also useful in reducing temperature; it may be repeated every four hours or oftener if necessary. Of the drugs used as antipyretics, quinine is probably the best.

Night-sweats.—Night-sweats most often disappear when the patient has plenty of fresh air. But if otherwise $\frac{1}{100}$ grain of atropine frequently checks this distressing symptom. These night-sweats are probably due to exhaustion, and so Porter (8) recommends that an ounce of whisky be given just before the time the sweating usually begins; he has tried this with good results to his patients.

General debility.—The general debility which attends tuberculosis is, as we have seen, best treated by rest, fresh air, and good food. But there are cases in which certain drugs may with advantage be added to the dietary. For example, if there is much anæmia iron will hasten the production of hæmoglobin, and arsenic should stimulate the bone marrow to a better supply of red corpuscles. If, again, for any reason the patient cannot take a sufficient quantity of fat the deficiency may be made up with cod-liver oil alone, or, perhaps better, combined with extract of malt. Nerve tonics, such as strychnine and phosphorus, may likewise be indicated in certain patients of a nervous temperament. Drugs, too, might be useful in lowering or raising the blood pressure as may seem desirable. If, for instance, the opsonic index of the blood be high, cardiac and vascular tonics may be of advantage, for the more vigorous the blood stream the more active will be the lymph flow and the greater will be the chance of the opsonins reaching the bacilli in the tuberculous lesions. If, on the other hand, the

lesion be active it may be better to have it shut off as much as possible from the blood plasma, and hence such drugs as iodide of potassium and other vascular sedatives should rather be given.

TREATMENT BY PROPHYLAXIS.

In considering prophylactic treatment we must always bear in mind that there are two factors at work in the production of tuberculosis. The first is the tubercle bacillus, the exciting cause of the disease; the other is a suitable soil, or a predisposition on the part of the tissues to the growth of this bacillus. The former of these may at first sight seem the more important, for without the tubercle bacillus there can be no tuberculosis. But, in view of the fact that this bacillus is ubiquitous, and that mostly every person is liable to be infected thereby, the latter factor, at least under existing conditions, really comes to be the more important of the two. Nägeli (9) found that in 284 *post-mortems* investigated at the Zurich Pathological Institute 97 per cent. showed signs of a tuberculous lesion of some sort or another. Of these, 63 had died of tuberculosis, 104 showed signs of an active tuberculous lesion, and 111 of latent or healed lesions. These figures, along with others, show, therefore, that not only is the proportion of people liable to infection very great, but that a very large proportion actually do get infected at one time or another in their lives. This illustrates, then, how widespread must be the sources of infection, and how much we must depend on our tissues to save us from the disease.

But while it is true that the tubercle bacillus is everywhere, that is no reason why something should not be done to prevent such a state of things. We know the chief source of dissemination to be the spit of tuberculous patients; disinfection of the spit of these people is, therefore, a most important prophylactic measure. But so many are tuberculous who know it not, that prophylaxis must insist on everyone who spits having his spit at once disinfected. Milk from a tuberculous cow may be another source of infection, particularly in children whose food consists so largely of milk. But a pure milk supply, as well as the prevention of spitting, are matters

for the public health authorities. As things at present exist, complete avoidance of infection is almost an impossibility ; it would mean avoiding railway trains, cities, and all such places where human beings gather together. Dosage, however, counts for a good deal in contracting disease; for, while the tissues can usually destroy the invading micro-organisms when few in number, if present in larger quantity they more readily multiply, and so produce disease. This has been definitely shown by experiments on animals. So, while it may be diffi-cult for the individual to get away entirely from the all-pervading tubercle bacillus, he may, by living much in the open air, by avoiding ill-ventilated rooms and places where dust gathers, greatly lessen his chance of infection.

If the difficulty of preventing infection is so considerable, we must give all the more regard to the other factor in the production of tuberculosis, namely, the tissues of the person infected. That certain people have an immunity, or at least a relative immunity, to tuberculosis seems clear when we consider the healed lesions met with *post-mortem* in those who have died of other ailments, or when we think of the number of indi-viduals living for years, it may be, in intimate contact with cases of consumption, and yet who do not contract the disease. But, on the other hand, we find those who show little resistance to the tubercle bacillus, and these we cannot but regard as having no such immunity. This susceptibility often seems to run in families. But, as we have already seen, there also seems reason to believe that a person's degree of immunity may vary with his state of health. A natural immunity may be broken down if the general health of the individual should in any way suffer, and such a person may contract the disease. On the other hand, much can be done for those who would seem to have inherited a predisposition by looking to their mode of life, and seeing that it is so ordered that it will produce a thoroughly healthy body.

From this it will be seen that prophylaxis means really living a healthy life. There must be a due regard to the laws of health, adequate exercise in the open air, well-ventilated rooms, good food, good hours and no undue fatigue. Any illnesses, especially those of the pulmonary mucous membranes must be carefully treated. And while this is of importance for the person who is not predisposed, it is doubly important for one

who would seem to have no such immunity. The members of tuberculous families, the sons and daughters of tuberculous parents should be particularly careful of their general health. In choosing an occupation they should give preference to one which will keep them in the country and out of doors. They should avoid a too laborious life. Vaccination with "Tuberculin R." might also be used in such cases. There seems little doubt that a very considerable immunity to tuberculosis has been produced in animals by means of vaccines; and although this has not been applied to any great extent as a prophylactic measure in the human subject, one hopes that such will soon be the case, and that ultimately the treatment of tuberculosis will be entirely preventative just as the treatment of smallpox is now almost entirely preventive.

REFERENCES.

1. MARAGLIANO.—" Specific Therapy of Tuberculosis and Vaccination against the Disease." A Lecture delivered under the auspices of the Henry Phipps' Institute, March 28th, 1904. First Annual Report of the Henry Phipps' Institute, Philadelphia, 1905, p. 195.
2. Ibid., p. 215.
3. Third Annual Report of the Henry Phipps' Institute, Philadelphia, 1907, p. 89.
4. Sir ALMROTH WRIGHT.—' The Clinical Journal,' November 9th, 1904.
5. Sir ALMROTH WRIGHT, S. R. DOUGLAS, J. FREEMAN, J. H. WELLS, and ALEX. FLEMING.—' The Lancet,' November 2nd, 1907.
6. Ibid.
7. M. S. PATERSON and A. C. INMAN.—' The Lancet,' January 25th, 1908.
8. WILLIAM PORTER.—' International Clinics,' Series XVI, vol. iv, 1906, p. 85.
9. NÄGELI.—' Virchow's Archiv,' vol. clx, p. 426.

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